OCTOBER 1955

Newest Way to Figure Machine Payoff

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MANAGEMENT AND MAINTENANCE

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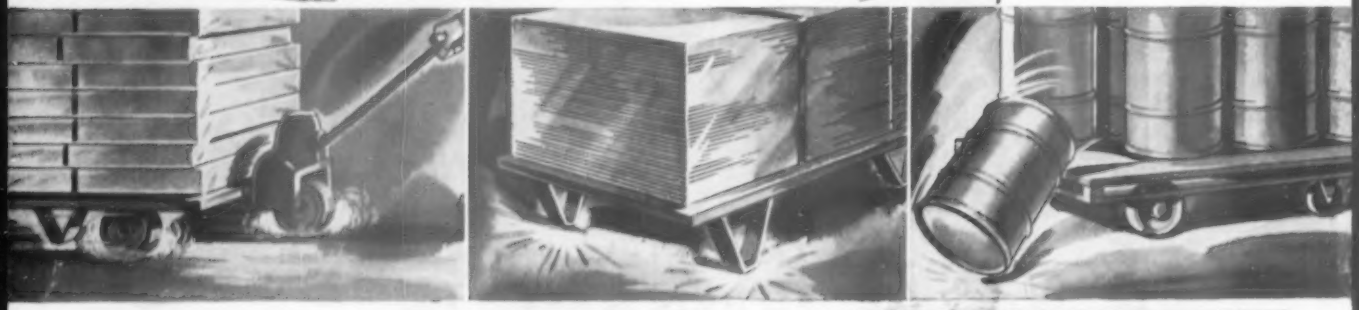
will your floors be SHATTERPROOF?

No concrete floor surface provides an absolutely true plane. Even minor irregularities intensify impact, causing a continual hammering action.



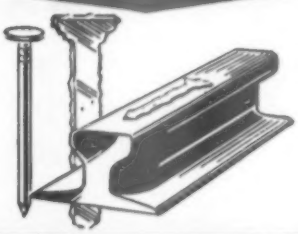
Hard aggregates do not necessarily make long-life floors. Many aggregates—even traprock, granite and emery—are unfortunately brittle. Impact from truck wheels, pallets and skids, and falling objects can shatter these brittle materials, produce ravelling, and start a chain of costly floor maintenance.

Masterplate metallic aggregate is tough yet ductile. The scientifically graded iron particles cushion impact, prevent ravelling and provide the highest abrasion resistance*.

Many million square feet of Masterplate floors are in use today and giving excellent service. Masterplate floors are virtually non-absorbent, oil proof and resistant to many corrosives found in industry.

Full information on Masterplate and "see-for-yourself" demonstration kit on request.

*In U. S. National Bureau of Standards Tests the Masterplate type floor had 6 times greater resistance to wear than the best plain concrete floor.



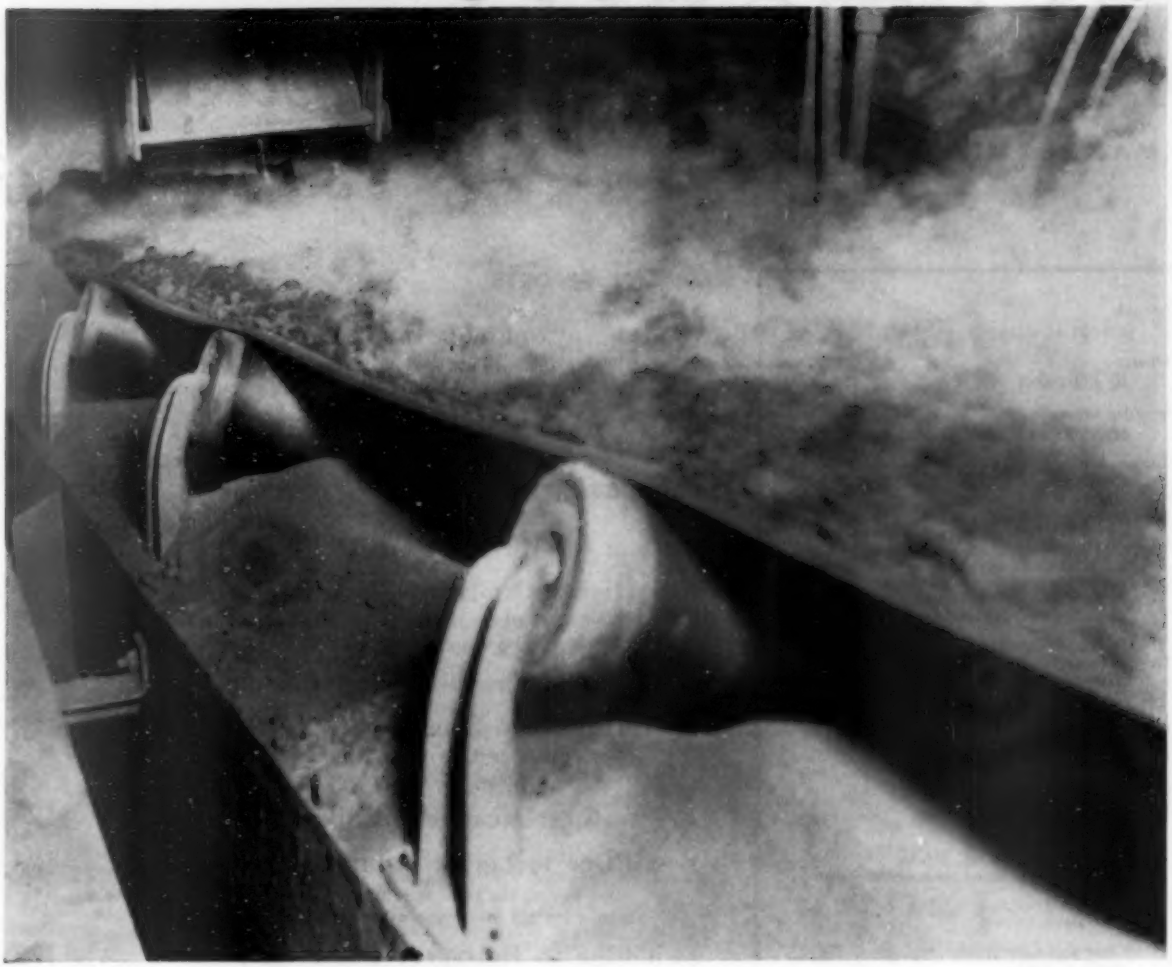
Basic principle of MASTERPLATE

You know what happens to a nail on the railroad track—it doesn't fracture or crumble; it merely flattens, retaining the same general shape. This is the basic principle of Masterplate. Because of its ductility, Masterplate, unlike brittle material, "gives" under impact, producing a floor with great wear resistance.

The MASTER BUILDERS Co

Subsidiary of American-Marietta Company

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Too hot to handle but it travels on rubber

A typical example of B. F. Goodrich improvement in rubber

THAT moving rubber platform is carrying sizzling hot chunks of iron and sand in a foundry. The heat had been ruining belts in a few months.

Then the company heard that B. F. Goodrich had developed a special heat-resisting rubber that can stand hot materials that would char or burn ordinary rubber. They built this rubber into a belt. Then, for good measure, added a layer of nylon cords near the surface to help prevent damaging cracks in the cover.

This improved B. F. Goodrich belt is what you see in the picture. It has already outlasted any other belt ever used here and looks good for double the life.

Product improvement is *always* going on at B. F. Goodrich. Some improvements are big, spectacular; some are little; many are too technical to explain easily, but all save you money. Every product gets its share—conveyor belts, V belts, every kind of hose, hundreds of others. None is ever regarded as "finished" or standardized.

How this cuts your costs: Biggest cost savings come almost always from top performance rather than lowest prices. If you use rubber products, remember B. F. Goodrich is one company that will *never* lower its quality standards. This means you can be sure of top performance and real money savings. If you want this extra value, these lower costs year after year, always call your B. F. Goodrich distributor. Find out about the latest improvements or try out the latest and best types of any rubber products you buy. *The B. F. Goodrich Company, Dept. M-483. Akron 18, Ohio.*

B.F. Goodrich
INDUSTRIAL PRODUCTS DIVISION

FACTORY | Reader's

MANAGEMENT AND MAINTENANCE

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THE MAGAZINE OF PLANT MANAGEMENT FOR 64 YEARS

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

FACTORY MANAGEMENT AND MAINTENANCE
OCTOBER 1955 Vol. 113, No. 10

(a consolidation of Factory and Industrial Management, including Factory, and Maintenance Engineering). Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860 1948), Founder. Executive, Editorial, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi,

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FACTORY | LETTERS

BUSINESS FUTURE

Sir:

FACTORY is my most important monthly publication. Of all of the periodicals I must read I have told my associates that FACTORY gives me more than most of the other readings. I regret that I do not keep my reading current, but not a copy of FACTORY is discarded until I have an opportunity to read it from front to back. Just last night while reading the May issue I came across several items of interest, and your invitation to request your report on "Business' Plan for New Plants and Equipment — 1955-1958" was not the least of these.

Your courtesy in sending me a copy of this report will be appreciated, and I wish you continued success in your good work.

B. A. Galbraith
Bernard A. Galbraith & Co.
Management Consultants
Nauvoo, Ill.

INCENTIVES PRO AND CON

Sir:

W. W. Taylor's article "New Look at Methods Incentives" (FACTORY, August, 1955, pp. 90-93) presents a view which I believe is contrary to sound engineering practice.

Mr. Taylor states a problem: Incentives tend to loosen, often run away, and workers begin to limit production output because of changes in methods. He then goes on to say . . . we should not solve the problem, we should circumvent it! . . .

From time to time incentive rates do get out of line because of method

Turn to page 8

Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Advertising Director; J. E. Blackburn, Jr., Vice President and Circulation Director.

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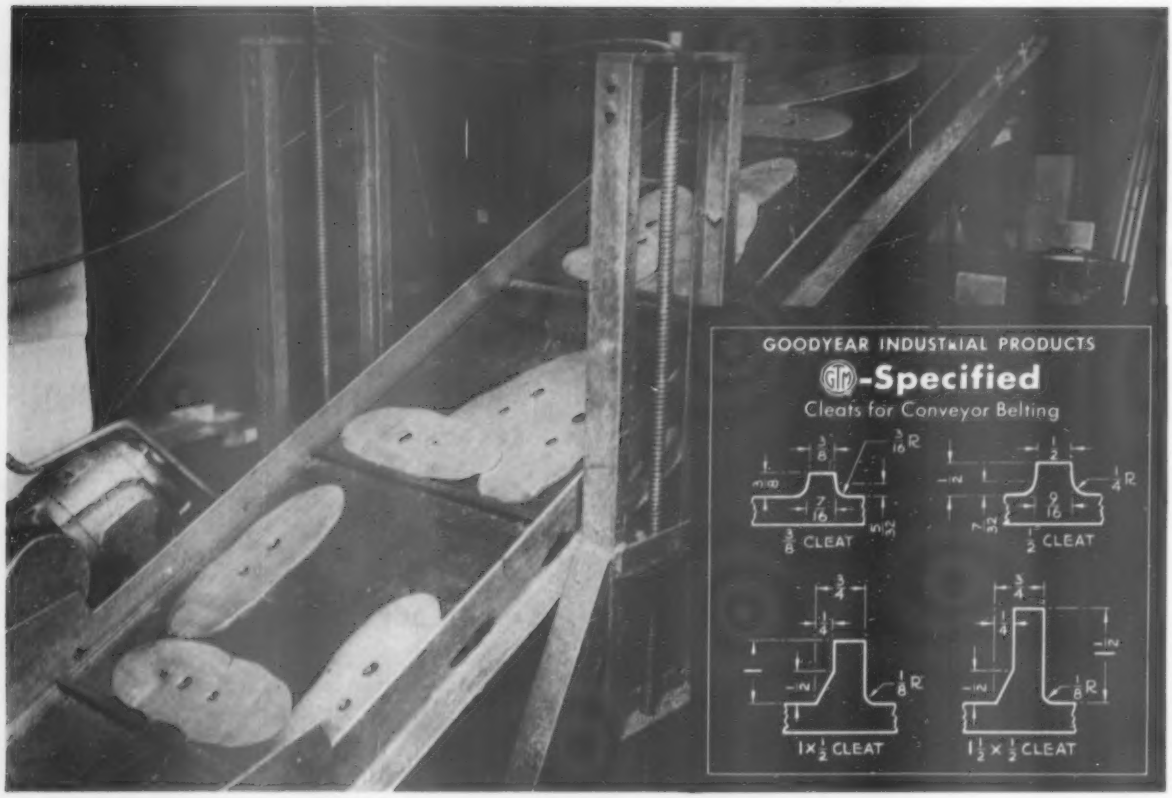


New Cleated Conveyors

for "upping" your production

HERE'S a new development by the G.T.M.—Goodyear Technical Man—that may help your production climb to new heights. It's a new line of conveyor belting made with tough, firm-gripping cleats integrally molded into the top cover.

This belting was designed by the G.T.M. to answer the problem presented in carrying metal stampings, machine parts, smooth packages and other hard-to-handle items up inclines too steep for smooth or rough top beltings. On conventional belting, such objects slip and slide, causing pile-ups, stoppages and damage. Mechanically fastened, wooden or metal cleats would stop the slipping, but the rivets would pull out, weaken the belt or otherwise cause trouble.

By molding the cleats right into the belt, the G.T.M. answered both the handling and the durability problems. He then made this belting extremely versatile by making it available in a number of cleat sizes and spacings, a variety of widths and weights, and in standard or heat- or oil-resistant compounds. But for full details on how to "up" production, easily and economically, with his new *cleated* belting, see the G.T.M., your Goodyear Distributor or write Goodyear, Industrial Products Div., Akron 16, Ohio.

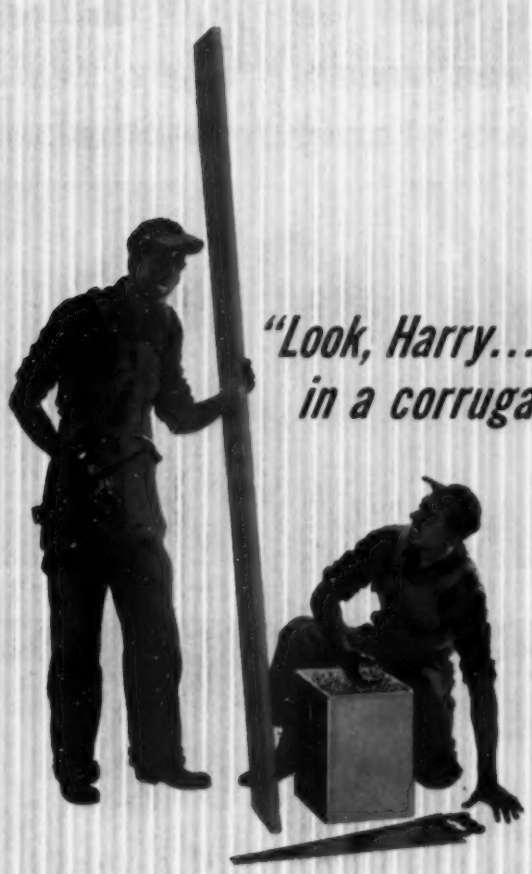
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

CLEATED CONVEYOR BELTING by

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network



"Look, Harry... nails in a corrugated box!"

Know why? Because H&D's practical Hevi-Duty box weighs only half as much as the wooden nail keg... takes a quarter less space ... stacks more neatly, handles easier, puts together faster, provides excellent printing space and costs much less in the first place.

Small wonder nail-makers (and countless other manufacturers) are turning to corrugated packaging in general... to Hinde & Dauch in particular. Why not let us solve your packaging problem?

HINDE & DAUCH

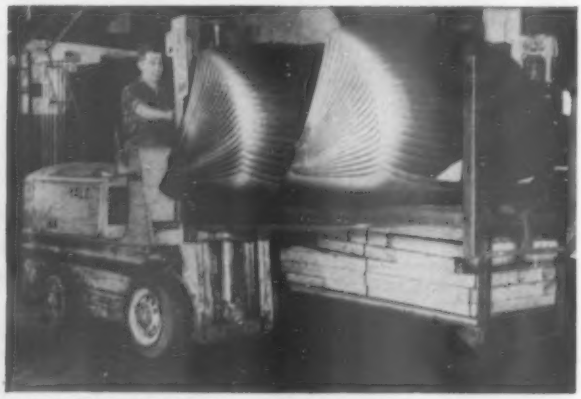
Division of West Virginia Pulp and Paper Company

AUTHORITY ON PACKAGING • SANDUSKY, OHIO
13 FACTORIES • 40 SALES OFFICES

B.F.Goodrich

Industrial tires wear longer, resist cuts better, automotive stampings company reports

Crane lifts a giant steel bar in the factory yard.



Tires roll on oily floors to carry deck lids out of the Press Shop.

Finished cowl panels are delivered to Shipping Dept.

Scrap material that can injure tires is stored in Wood Mill.

THESE photographs were taken at the Detroit, Michigan, factory of one of the country's leading manufacturers of automotive stampings. Here over 200 materials handling units work in the yard or on floors often covered with tire-killing iron and steel scrap and oil. Premature tire failure could be common. But it's not, thanks to B. F. Goodrich industrial tires.

B. F. Goodrich industrial tires are hard to beat, the supervisor of truck repairs reports. They wear longer and resist cuts better than other tires. That's because the B. F. Goodrich Tire and Wheel Analysis man matched the tires to the job.

You can have a FREE TW Analysis, too

The B. F. Goodrich Tire and Wheel Analysis man will study your equipment, loads, hauling surfaces and any special problems you have. Then he'll recommend the right industrial tires for you to use—the right type, size, tread compound and tread design. You can save as much as 50% from this service, as much as 20% from the maintenance tips he gives. His services are FREE and unbiased, because B. F. Goodrich makes a *complete* line of industrial tires.

Mail the coupon today. Consulting engineering service is available to manufacturers of materials handling equipment.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-526, Akron 18, Ohio

Please send me additional information on your Tire and Wheel Analysis Plan

Name_____

Company_____

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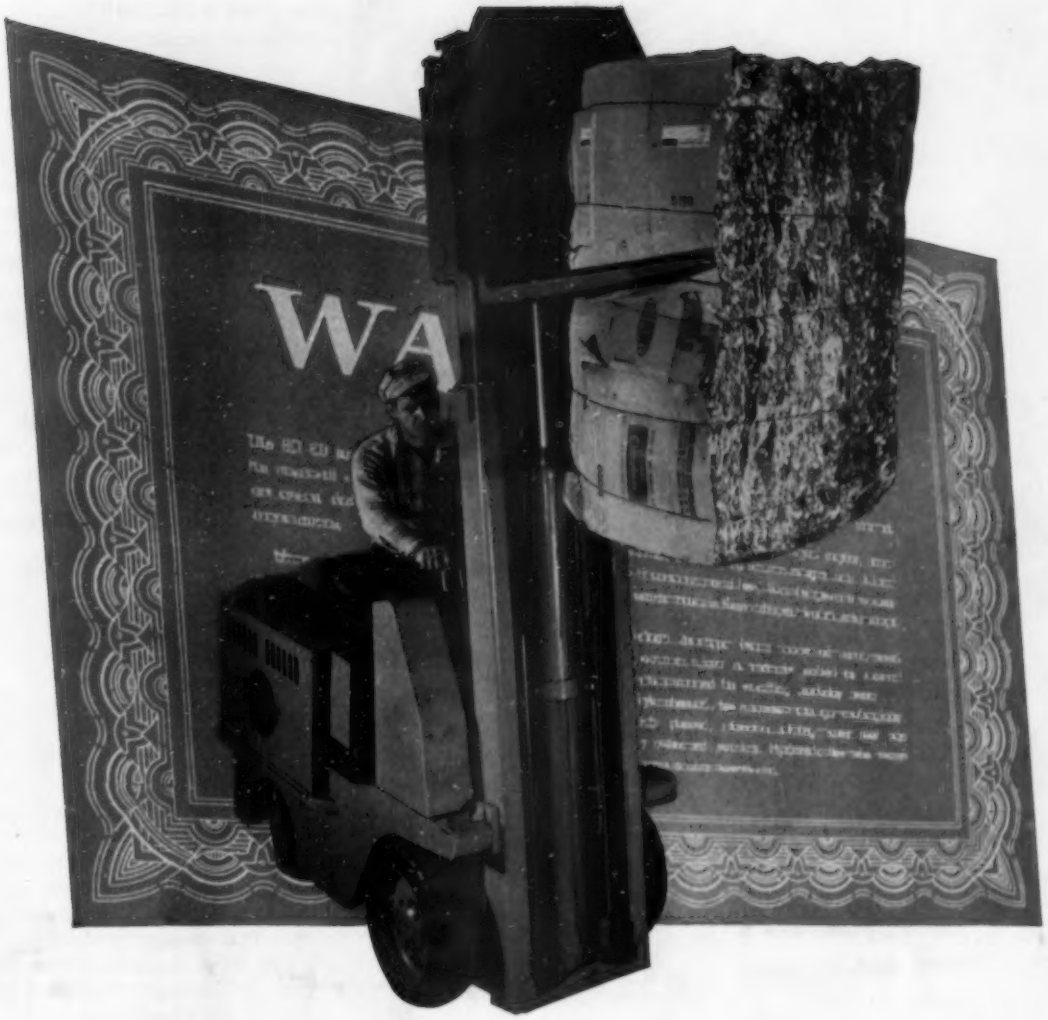


Insist on a...

ONE YEAR WARRANTY

when you buy an electric fork truck

All Baker battery-powered industrial trucks—including fork, platform, crane trucks and tractors—are warranted against defects for a full year from date of shipment.

As a truck purchaser, you should accept nothing less.

A one-year warranty assures you that the manufacturer has complete confidence in the materials and workmanship that go into his product. It gives you twelve months protected operation of the truck *under your conditions*—allowing ample time to detect imperfections, which might not show up during a 30, 60 or 90 day guarantee period.

Baker Trucks have a half-century reputation for outstanding performance, long life and low maintenance. For example: a fleet of the first Baker ram trucks ever built is still in service at a large midwestern steel mill after 32 years!

Let a Baker handling engineer give you the full story, or write for Bulletin 54B. The Baker-Raulang Company, 1218 West 80th Street, Cleveland 2, Ohio.

Baker.
handling equipment

522

ALWAYS DEPENDABLE

When you buy Udylite barrel plating cylinders you get more than good materials—you get the experienced engineering that has made Udylite barrels the best built, longest lasting, most economical barrels on the market. For Udylite barrels are constructed with the characteristics of the materials well in mind—and engineered accordingly.

Along with fine engineering Udylite is in continuous search for materials giving longer life and greater over-all economies in barrel plating. Udylite manufactures barrels of Rubber, Bakelite, Melamine, Lucite and now in turn has developed Tempron Hard Rubber.

Tempron Hard Rubber is recommended as the best plating barrel cylinder material now available, but its characteristics require special construction. Udylite's new construction (patent pending) features interlocking panels and ribs with the added advantage that panels, ribs, rails and cylinder heads are individually replaceable.

Tempron Hard Rubber has greater abrasion resistance, will handle more cleaning and plating solutions at higher temperatures including hot Stannate Tin, and with Udylite's new construction, will take the hard pounding of heavier loads day after day.

It will pay you to investigate Tempron Hard Rubber cylinders. Fill out the coupon below and mail today.

WORLD'S LARGEST PLATING SUPPLIER

We would like to discuss Tempron Hard Rubber cylinders with your sales representative. Please have him call.

NAME

COMPANY

STREET ZONE

CITY STATE

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

changes. But removing incentives will not give you more control over methods, it will give you less. Good standards allow a specific manner. Incentives are not for pay purposes only. They provide management with certain measurements—which if applied correctly can measure changes in methods as well as changes in earnings . . .

You can't expect a foreman to do someone else's job. The responsibility for correct standards and proper methods lies with the industrial engineer. . . . To have a check on incentives, you don't have to tighten supervision, you have to strengthen your controls.

Incentives are supposed to give you greater productivity today! When an incentive system loosens up because of changes in methods, several years have gone by. The methods incentive plan can have positive results only over a period of years. What are you going to use to reduce costs today?

According to Mr. Taylor . . . the basis for a good incentive system . . . is "to increase productivity through better methods, rather than through greater speed." This presupposes that the greater productivity that is a result of incentive systems comes from speed alone. Operators on incentive don't work faster, they work more consistently.

Alternative? Yes. Why not follow this formula?

(a) Establish a suggestion system to encourage and reward workers.

(b) Set standards for operations and process on a sound basis.

(c) Establish an incentive system that gives the desired response point — an incentive system that brings operators' production up today.

(d) Explain that each standard covers doing each operation in a particular manner under a given set of conditions.

(e) Measure the daily and weekly changes in productivity using the same frequency distribution charts used in methods incentives. Other yardsticks can be designed to show other changes and shifts.

(f) Using the various yardsticks that show these changes, change the standards as the methods change.

Turn the page

Towmotor Fork Lift Trucks conserve floor space by stacking materials right to the ceiling, give industry . . .

SAVINGS by the bagful!

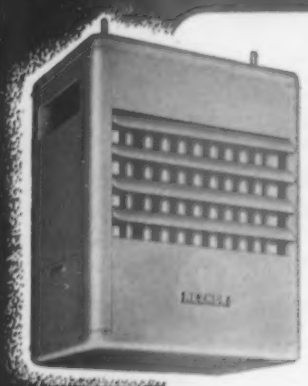
Caught in the "squeeze" between *rising costs* and *lower profits?* Towmotor Mass Handling can help you cut production costs *at once* – by eliminating wasted manpower, overtime and inefficiency – put your company in a more favorable position both cost-wise and sales-wise. Find out how **EXTRA PROFITS** can be *yours* by writing today for a Certified Job Study covering materials handling savings made in your specific industry. Address: Towmotor Corporation, Div. 510, 1226 East 152nd Street, Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS and TRACTORS Since 1919

IT'S HARD TO COMPETE WITH A TOWMOTOR EQUIPPED PLANT!

Good Heating Is Good for Production



The best production equipment, the most carefully planned production line can fail to pay off if unfavorable working conditions impair worker efficiency. Comfortable workers do a better job; good heating means increased production, fewer rejects. Poor heating means more errors, increased absenteeism.

Is your heating system as efficient as your production line? The check list below will give you the answer.

YES	NO	
■	■	*Can your heating system deliver heat instantly to the point of need?*
■	■	*Can it maintain comfortable working conditions in offices as well as out in the plant?*
■	■	*Does it meet your need for heat without occupying a single square foot of space you could use for any other purpose?*
■	■	*Does it operate completely automatically — with absolutely no labor costs?*
■	■	*Can it maintain comfortable temperatures even around trouble spots such as large doors?*
■	■	*Can it be easily and economically expanded to keep pace with expansion of your plant layout?*
■	■	*When only part of the plant is operating, can it heat just the areas in use as economically as it does the entire building?*

If you have to answer "no" to one or more of these questions, inefficient heating may be responsible for unnecessarily high production costs. Reznor suspended gas unit heaters, by giving you maximum heating efficiency, will increase your production efficiency, too. Often this can be done by installing Reznor units to supplement your present heating system. Or it may pay you to completely replace your present system with automatic Reznor heaters. And, of course, you'll want more information about the efficiency and economy of Reznor gas unit heating before you plan any new buildings. See the Reznor catalog in Sweets Plant Engineering or Industrial Construction Files or write for more information. You'll get action. Fast.

REZNOR
THE WORLD'S LARGEST-SELLING GAS UNIT **HEATERS**
Reznor Manufacturing Company, 67 Union Street, Mercer, Pa.

Begins on page 3

Production incentives certainly bring a lot of headaches. But production incentives are not a disease to be eliminated — we only want to cure and control the headaches.

Harvey Gittler
Chief Industrial Engineer
Sonotone Corp.
Elmsford, N. Y.

Sir:

The August issue containing the article by W. W. Taylor entitled "New Look at Methods Incentives" struck us as being a rather important and interesting one. We believe that Mr. Taylor has certainly gotten to the root of a basic matter regarding wage incentives.

R. R. Renner
Vice-President
Casco Products Corp.
Bridgeport, Conn.

► **Author Taylor's had his say; Reader Gittler says, "No." Reader Renner sides with Taylor. Anyone else want to stick his oar in?—ED.**

LABOR RELATIONS

Sir:

We have found "Practical Labor Relations" section in FACTORY an invaluable guide to NLRB trends in thinking. We would like to know if you publish a summary of NLRB decisions catalogued under various types of cases and in a condensed form of each decision.

Herman L. Buffington
President
The Punxsutawney Co.
Punxsutawney, Pa.

► **Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C., publishes an annual index. Bureau of National Affairs, 1231 24th St. N.W., Washington, also can help.—ED.**

AUGUST ISSUE

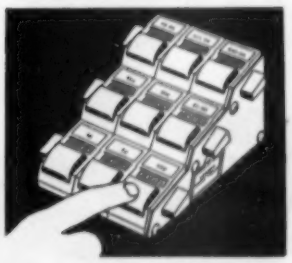
Sir:

I rarely write this type of letter, but the August, 1955, FACTORY has aided me to such an extent that

Added Evidence that . . .

Everyone Can Count on VEEDER-ROOT

In figuring out new systems of automatic electrical control, Veeder-Root *Count*rol can supply vital connecting links. For instance, this Predetermining Counter can be hooked into such a system to light a light, ring a bell, or actuate a mechanism to stop a machine or process *at any pre-set point.* And there are many other Veeder-Root Counters that can serve as "countponents" in almost any way desired. Or special counters can be designed for specific applications. Engineers in any industry, now engaged in working out automatic control systems, can count on Veeder-Root engineers to work with them on any problem where reliable facts-in-figures are needed.



New *Vary-Tally* Multiple-Unit Reset Counter comes in any combination up to 6 banks high, and 12 units wide. Write for news sheet and prices.

VEEDER-ROOT INCORPORATED • Hartford 2, Connecticut

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C. • Montreal 2, Canada
Dundee, Scotland • Offices and Agents in Principal Cities

"The Name That Counts"

"For over 19 years Janitrol has given excellent heating performance" at CECO STEEL

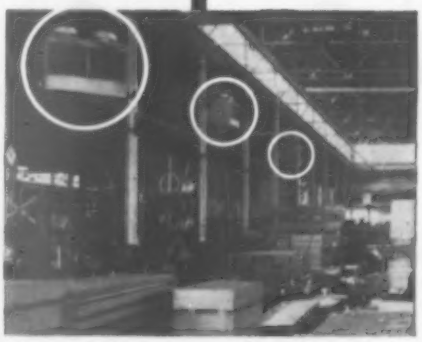
says
Mr. Hobart S. Peterson
Supt. of Construction
& Maintenance, Ceco
Steel Products Corp.

"We originally selected our first Janitrol Gas-Fired Unit Heaters in 1936 to eliminate the need for a central boiler system, large stack and continuing operation and maintenance costs. Because of their excellent performance record, we have continued to specify Janitrols wherever possible," states Mr. Peterson.

Ceco Steel's experience is not unusual. Janitrol's performance has been proved in thousands of commercial-industrial heating applications. With over a million Janitrol heat exchanger tubes installed since 1940, less than ¼ of 1% have been replaced for any cause!

If you're building or modernizing, investigate the advantages of unit heating with your Janitrol engineer-installer. He's listed under "Unit Heaters" in the yellow pages of your phone book.

MORE INFORMATION?
Write for our selection of 18 case histories. Ask for No. JS-226, "Quick Facts". *It's Free!*



The Ceco production area is heated by suspended Janitrol Unit Heaters. They occupy no floor space . . . do not interfere with production.

Janitrol
GAS-FIRED UNIT HEATERS

Janitrol Heating & Air Conditioning Division
Surface Combustion Corporation, Columbus 16, Ohio
In Canada: Alvar Simpson Ltd., Toronto 13

ALSO MAKERS OF *Surface* INDUSTRIAL FURNACES AND *Kathabar* HUMIDITY CONDITIONING

I cannot neglect a note of thanks.

Your articles on industrial lighting, worker training, cost reduction, and production scheduling are outstanding and of great interest to me in my present position, and I have learned much from them.

Neville Lancaster
Cost Reduction Engineer
Kellogg Switchboard & Supply Co.
Chicago

PEERLESSS CASE

Sir:

In the June, 1955, issue of FACTORY (p. 228) there appeared a short statement concerning the Peerless Tool and Engineering Company case. The conclusion drawn was that a union must handle grievances without discrimination.

In this partciular case, it was apparent that the motive for threatening to refuse to process grievances was not a legitimate one and that coercion was involved.

This raises question as to whether unions, fearful of charges of discrimination, might process unworthy grievances . . . I note that there have been other cases of refusal to handle grievances, and that . . . a union is obligated to process grievances for non-members as well as members so long as it represents them; and that generally handling of grievances is a part of the union's business which it cannot withhold. However, there is a fine line between refusing and failing to find sufficient merit in a grievance to handle it.

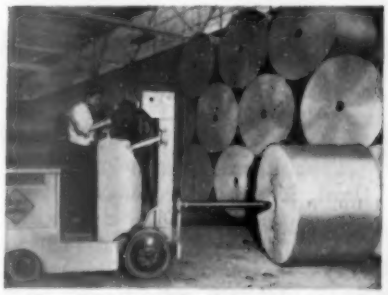
I wonder whether in your experience you have come in contact with cases where a union has processed unworthy grievances for fear of discrimination charges, or where it has been accused of discrimination because it failed to see merit in a grievance.

A. E. Potteiger
Labor Relations Supervisor
Rohm & Haas Co.
Philadelphia, Pa.

► **Experience shows that many union grievance committees will process a grievance that relates to a member of a minority group solely for the purpose of avoiding discrimi-**

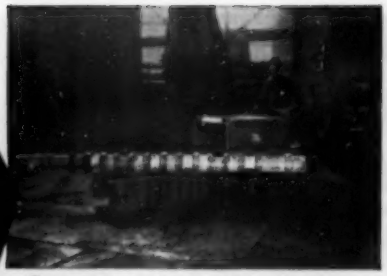
TEN TRICKS *with* TRUCKS

1. *E-P crane lowers bomber engine into place. Twice as fast as previous method, with less labor.*

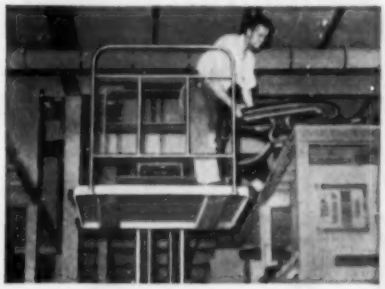


2. *E-P fork truck picks up rolls on ram —even high tiered rolls—with but ¼" difference in size of ram and hole.*

3. *High stacking huge tires with Elwell-Parker fork truck—a skillful operation.*

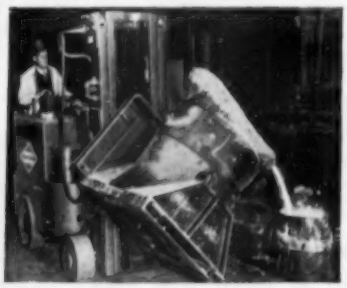


4. *Forged crankshaft, still at luminous heat, safely handled on skid by Elwell-Parker low lift truck.*



5. *Remote control switch enables operator to use fork (with safety steel platform) as elevator. This saves aisle space.*

6. *Platform of this Elwell-Parker enters right into annealing oven to deposit or remove loads.*



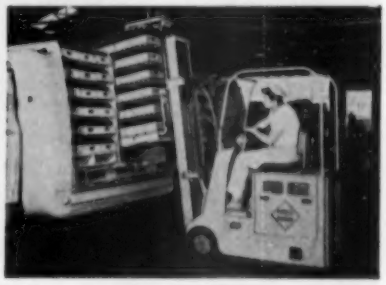
7. *E-P Rotary Device permits molten metal to be poured with ease and safety.*

New Condensed Catalog

Special Attachments Folder

Write Now For Your Copies

8. *ELPAR engineers replaced platform of high lift truck with 81" forks for these long loads. This cut investment in truck by 40%.*



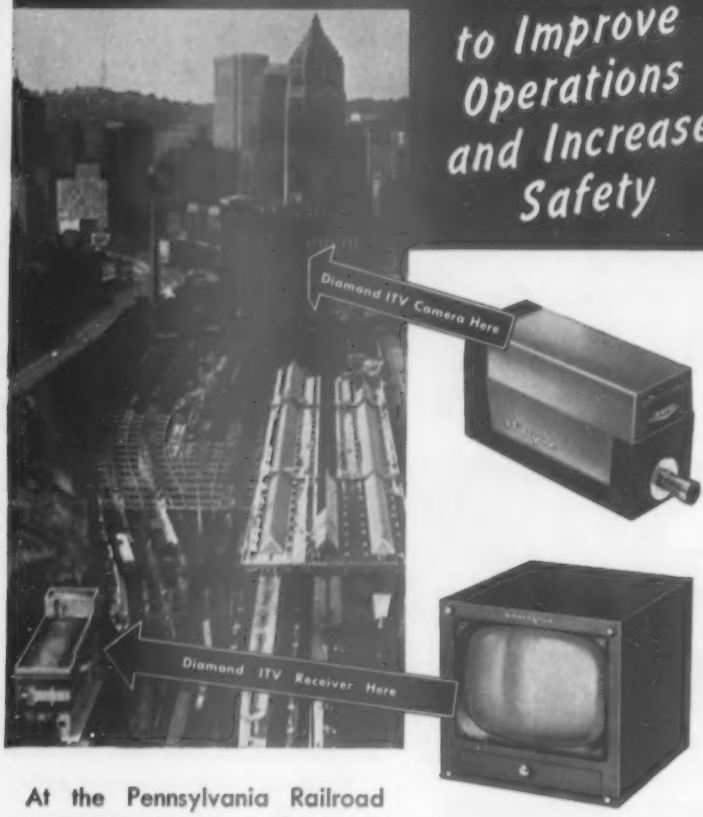
9. *Note the forward tilt . . . a special clamp stabilizes loads so they cannot bounce from pallet or skid.*

10. *Special E-P device retrieves pallet when load is deposited.*

There's no end to the versatility of ELPAR trucks. One user said, "We have done everything but eat with them!" From Elwell-Parker's vast reservoir of experience—gained during nearly 50 years' specialization in power trucks —industry is drawing a wealth of ingenious handling ideas. You can profit too. Ask your resourceful ELPAR man about applying trucks to unusual operations in your plant. The Elwell-Parker Electric Co., 4029 St. Clair Avenue, Cleveland 3, Ohio.

ELPAR
INDUSTRIAL TRUCKS

PENNSYLVANIA RAILROAD *uses* DIAMOND INDUSTRIAL TV *to Improve Operations and Increase Safety*



At the Pennsylvania Railroad terminal building in Pittsburgh, Diamond ITV watches the movement of mail cars in and out of the Post Office. The image is transmitted to the train director in a control tower 2000 feet away and on the other side of the terminal.

You, too, probably can use Diamond ITV to substantial advantage. For case histories and suggestions, get in touch with your Graybar Distributor or use the coupon below.

7259

Distributed by GraybaR ELECTRIC COMPANY

DIAMOND POWER SPECIALTY CORP.
"FIRST IN INDUSTRIAL TELEVISION"
ELECTRONICS DEPT., P.O. BOX 415GG
LANCASTER, OHIO

Please send me without obligation a copy of new bulletin showing how Diamond Industrial (Wired) Television will help me reduce costs, improve quality, increase sales and aid safety.

Name_____

Title_____

Company_____

Address_____

Begins on page 3

nation charges from that group. But there are many instances where the union is dilatory in processing the grievance of a member of a minority faction within that union. As to what management's responsibility is in such matters, it's hard to say. People like Tom Spates, Labor Professor at Yale, say that management should assume the initiative for protecting the individual rights of each of its employees. And that management is in the wrong when it permits the union to be the only spokesman for its members. Of course, such a viewpoint is difficult and often hazardous to carry out. But it's certainly worth considering.—ED.

TRAINING INDUSTRIAL ENGINEERS

Sir:

Your page 47, August 1955 FACTORY, includes "Moving Ahead in Engineering Education." May I point out that these items are 20 years behind the times?

Oklahoma University has had a school of General Engineering since before 1930, and I initiated the movement in 1928, when I was a freshman there, through Prof. J. C. Davis, School of Mechanics.

My idea was to enable students to go into power plant or factory work of any kind, by taking courses basic to ME, EE, and CE work, and electives to suit more specialized fields, as petroleum, chemical, and architectural engineering.

OU has graduated over 400 students with BS degrees in General Engineering, and has recently added Industrial Engineering options.

Will E. Hoskinson

Norman, Okla.

► The three MIT escapees on FACTORY's staff explain that MIT's new "Course 21" is an engineering equivalent of the liberal arts curriculum—will award an unspecified degree as Bachelor of Science. Our men add—not too modestly—that MIT conferred its first degree of BS in General Engineering back in 1918; and its predecessor course, General Science, enrolled its first student in 1864!—ED.

HOW TO GAIN THIS MUCH EXTRA STORAGE SPACE IN A 12′ AISLE*

Conventional counterweighted truck needs 136″ aisles... Automatic's TRANSVEYOR needs only 76″... *Use the difference for storage!*

The above dramatically illustrates the savings in storage space made possible with the Transveyor. Its short chassis and tight turning radius also enables it to operate swiftly and efficiently in cramped areas throughout the plant where less maneuverable trucks could not work.

Rugged and compact, the Transveyor is packed with exclusive Automatic job-proved features. Its *Balanced Action* equalizes load on both wheels, automatically...compensates for uneven floor surfaces with the exclusive center-pivoted feature which eliminates frame distortion and uneven load distribution.

Transveyors are available in stacker, low lift pallet or platform models to serve a wide range of requirements. All can be leased under Automatic's exclusive "Earn-Its-Own-Way" plan without 1¢ of capital investment. Convenient budget purchase plan is also available. Send for complete information today.

**Dimensions based on use of 48″ x 48″ pallets*

GET THE FACTS...MAIL THIS COUPON

Automatic®

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

Automatic 39 West 87th Street, Dept. T-5 Chicago 20, Illinois

☐ Send me complete information on Automatic Transveyors.
☐ Include data folder on the Automatic "Earn-Its-Own-Way" plan.

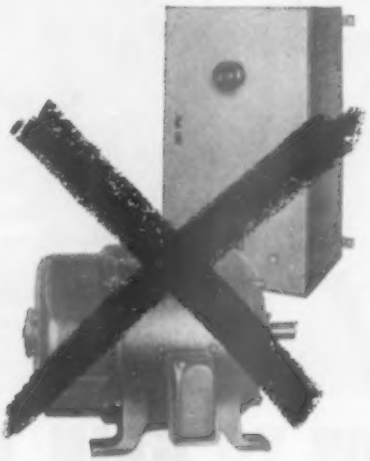
Firm.....

By.....Title.....

Address.....

City & Zone.....State.....

No need for Special Motors, Control with *Vari-Pitch* Sheaves



***Vari-Pitch* sheaves are the low cost way of providing accurate stepless speed control. There's a type and size for every need.**

Two Basic Types

1. Stationary control type can be used for infrequent speed changes when sheave is at rest.

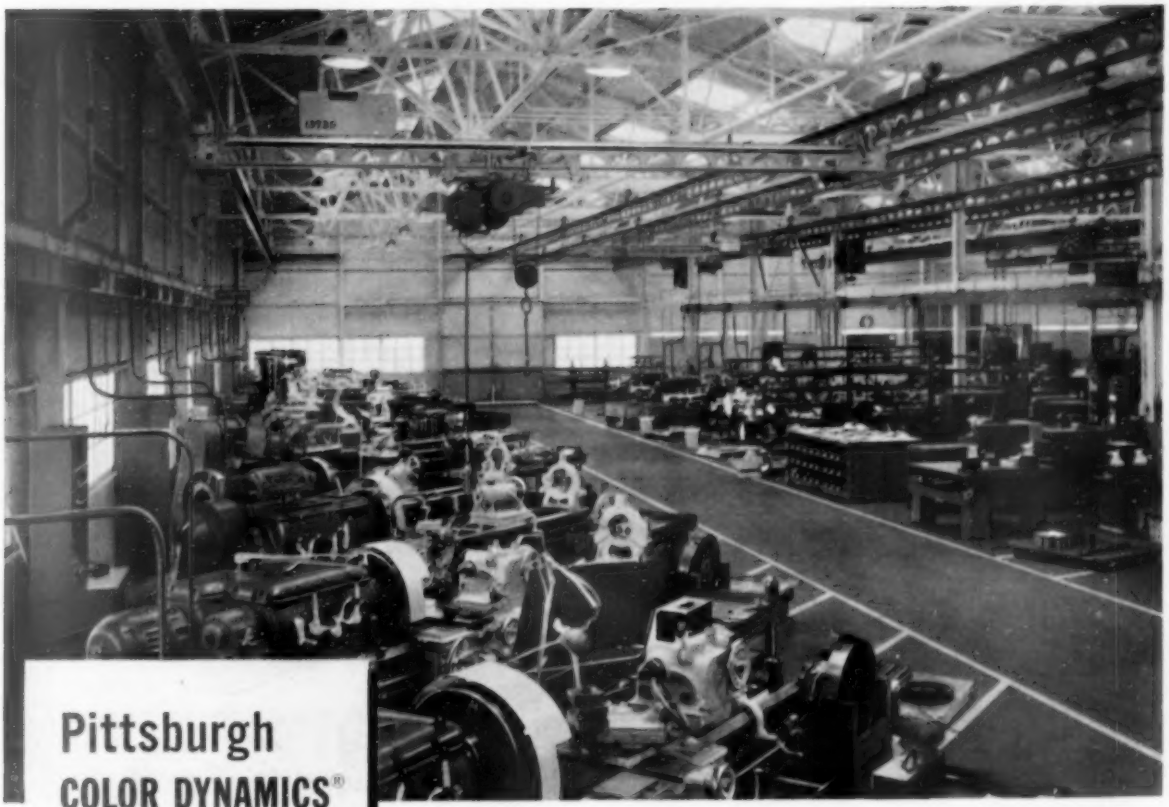
2. Motion control type is available for applications requiring repeated speed changes while drive is in motion.

Both types are available in standard range sheaves to provide speed variations to 196%, and in wide range type sheaves to provide variations to 400%.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

For complete information
call your nearby A-C office or distributor — or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin. A-4843

ALLIS-CHALMERS



Pittsburgh COLOR DYNAMICS®

Helps Employees See Their Work Better!

Modern system of painting improves efficiency and morale by providing better lighted and more cheerful work areas in California machine shop of Westinghouse Corporation

HOW management and workers benefit from the use of Pittsburgh COLOR DYNAMICS is demonstrated daily in the machine shop of the western headquarters plant of the Westinghouse Electric Corporation at Sunnyvale, California.

This huge structure of steel and reinforced concrete was painted according to the principles of COLOR DYNAMICS to increase efficiency and provide cheerful surroundings.

Interior walls and ceilings were painted to raise the light level so that machinists can read micrometer markings easily. Stationary parts of machine tools were painted restful Vista Green and working parts Focal Ivory. Levers were painted Focal Yellow and electric controls, Focal Orange.

By reducing the effort needed to differentiate between machine, materials and controls the operator is able to focus his attention better on his task. Eye strain, nervous tension and physical fatigue are lessened.

Cranes, overhead conveyors and traffic lanes were painted with safety colors to reduce danger of accidents.

How successfully such purposeful use of color has contributed to productive efficiency and employee morale is summarized in this comment of G. F. Gayer, Plant Manager:

"We are so convinced that COLOR DYNAMICS has bettered production and employee relations in our machine shop that we are extending this method of painting to our other buildings. We want our other workers to benefit from such improved environment. Pittsburgh is to be complimented on the contribution to industrial planning its modern painting system is making."

This Westinghouse machine shop is only one of thousands of plants all over the country in which production has been improved with COLOR DYNAMICS. Why not try it in your plant next time you paint—and see what a difference it makes.

You Can Have an Engineered Color Study of Your Plant—FREE!

● We'll be glad to mail you a free copy of our illustrated booklet on COLOR DYNAMICS for industry. It explains clearly the principles of this modern method and how to apply them. Better still, we'll gladly submit an engineered color study of your plant, or any part of it, without cost or obligation. Call your nearest Pittsburgh Plate Glass Company branch and arrange to have a representative see you. Or mail coupon at right.

Send for a Copy of This FREE Book

Pittsburgh Plate Glass Company, Paint Div., Department FMM 100, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet "COLOR DYNAMICS."

☐ Please have your representative call for a COLOR DYNAMICS survey without obligation on our part.

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Street_____

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PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

American Blower
Venturafin
Unit Heaters are

Sound-engineered for quiet operation

Vertical Unit Heaters — Capacities: 58,400 to 560,000 BTU at 2 lbs. steam pressure and 60° entering air.

Horizontal Unit Heaters — Capacities: 18,000 to 357,500 BTU at 2 lbs. steam pressure and 60° entering air.

You don't have to *guess* about the quiet operating features of American Blower Venturafin Unit Heaters. Capacity tables for every size range give Quietness Levels from A to D (as shown) for each heater at each speed.

These Levels have been established from carefully prepared listening experiments in our sound laboratory, from tests at actual job surroundings and from combinations of correct wheel design and application.

Quiet operation, low initial cost, minimum maintenance and ease of installation are just a few of the features that make American Blower Unit Heaters the best buy for you. Consult your nearest American Blower Branch Office for data.

Suggestions on unit-heater selection

To meet specifications of quietness levels, consider these basic facts: (1) Several small units will be quieter than a few large ones (2) Two-speed units are better for extremely quiet operation (3) Vertical Units are less quiet than Horizontal models.

Relative Quietness Levels

QUIETNESS RATING	TYPE OF SPACE
A	Residences, churches, hospitals, libraries, class rooms, museums
B	Banking rooms, general offices, restaurants, public buildings
C	Gymnasiums, waiting rooms, cafeterias, super markets, garages
D	Warehouses, factories, foundries, packing plants, machine shops

Other American Blower Unit Heaters

American Blower's gas-fired unit heaters and de luxe cabinet heaters for commercial and industrial use are compact, efficient and easy to install.

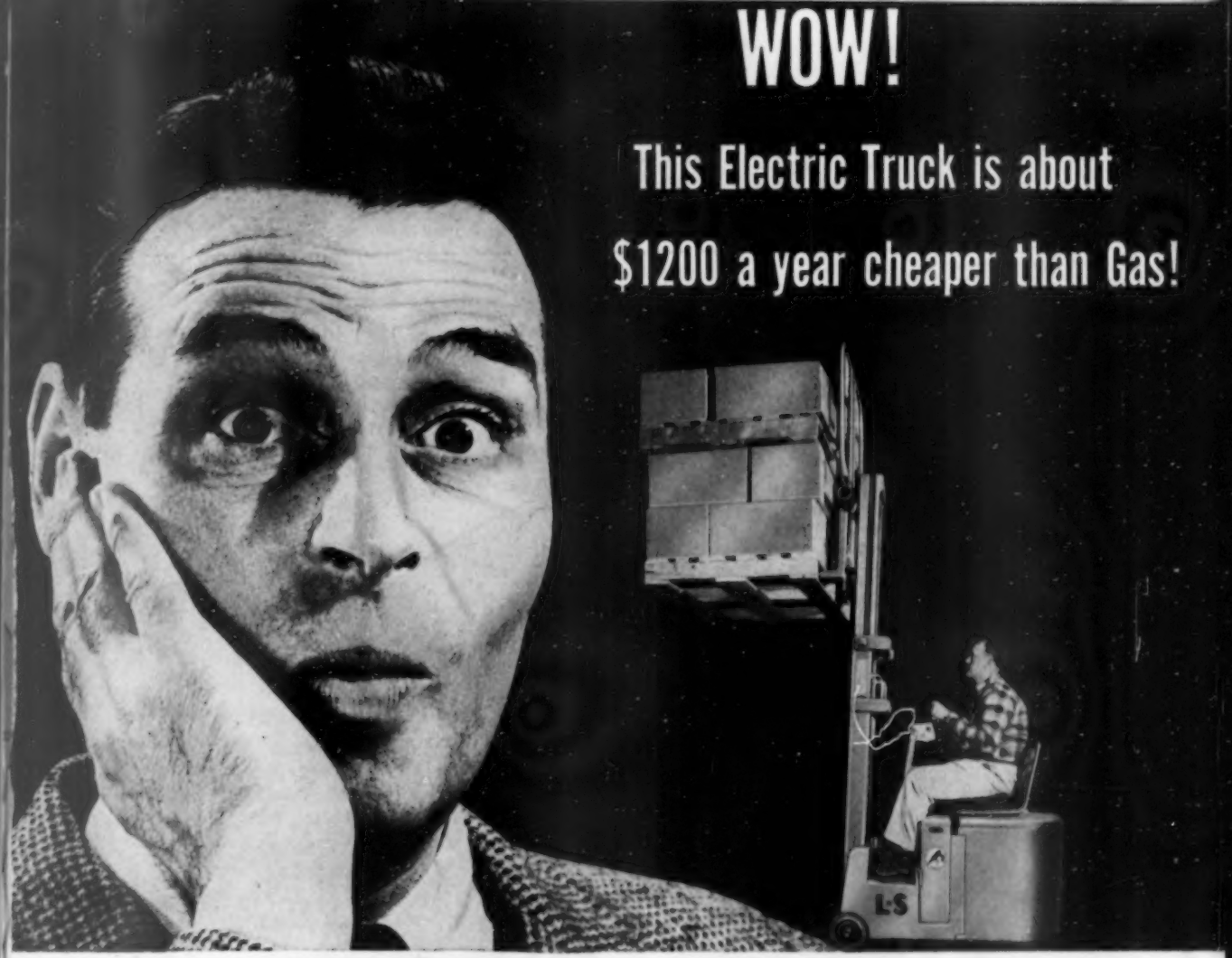
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE
DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

WOW!

This Electric Truck is about $1200 a year cheaper than Gas!



It's a fact — and user reports prove it — Lewis-Shepard Master Electrics save you hundreds, even thousands of dollars a year.

While the figures shown are average, it's obvious that if your application is suitable to either an electric or gas truck, you'll really save with a quality-built Lewis-Shepard Master Electric.

Just look at the Model "J" advantages:

- Lubricated for life — never needs greasing — this feature alone saves many hours of maintenance.
- Safe travel speeds for indoor operation, 3 speeds forward and reverse.
- Minimum aisle requirements — tightest turning counter-balanced fork lift on the market.
- Foot controlled traction, brake, lift, lower, and tilt — leaves both hands free to maneuver.
- A quarter a day runs the "J" — compare this with the $1.36 average 8-hour cost for running a gas truck.

And remember, you can obtain the Model "J" on any of Lewis-Shepard's 6 procurement plans . . . your "out-of-pocket" costs need not be higher to get the depreciation, maintenance, and power savings indicated above.

Why not write for all the facts. Use the coupon for convenience.

ANNUAL COST COMPARISON*

(2504 operating hours)

LEWIS-SHEPARD ELECTRIC Model J — 2000 lb. cap. @ 48" load length with 130 inch telescopic mast.		GAS TRUCK 2000 lb. cap. @ 48" load length with 130 inch telescopic mast.
$480	DEPRECIATION	$750
290	MAINTENANCE LABOR AND REPAIR PARTS	920
75	POWER OR FUEL	425
$845	TOTAL	$2,095

*average figures taken from user reports

MULTIPLY MANPOWER · LEWIS-SHEPARD

LEWIS-SHEPARD

1510 Walnut St., Watertown 72, Mass.

"The Master's Line"

Please send me

- ☐ L-S SpaceMaster Model "J" Catalog No. 33
- ☐ Gas vs. Model "J" Truck Cost Comparisons

Name _____

Company _____

Address _____

Gulf Products aid

Gulf Soluble Cutting Oil provides high cooling efficiency for this grinding operation on a propeller shaft.

A view of the material control area where the parts are stored in readiness for assembly after immersion in a tank of Gulf No-Rust FPR.

operations at Aerodex, Inc.

The world's most modern aircraft engine overhaul facility

By adapting mass production techniques to engine maintenance in the world's most modern engine overhaul shop at Miami, Fla., Aerodex, Inc. overhauls an engine with fewer man-hours than any other commercial organization. This represents a considerable saving to the Air Force, with whom Aerodex has large contracts, as well as to private concerns which send their engines in for overhaul.

Gulf products are used throughout the Aerodex shop to help speed their engine overhaul work. Gulf Lasupar Cutting Oil helps produce parts to extremely close tolerances with few tool changes in machining operations on many types of steel, while Gulf Soluble Cutting Oil provides high cooling efficiency for grinding operations. After machining, the parts are cleaned in a bath of Gulf Stoddard Solvent, then dipped in a tank of Gulf No-Rust FPR to protect polished metal surfaces against rust during temporary storage. Every engine is fueled and lubricated with Gulf Aviation Gasoline and Aviation Oil during the 3¾ hour test run after final assembly. And various other Gulf Quality Products help keep the auxiliary equipment required for a large operation of this type working smoothly and continuously.

You too will find, as did Aerodex, that there is a Gulf Product to fit your every need —quality oils and greases that can help you improve production and lower your maintenance costs.

Consult the telephone directory for the number of your nearest Gulf office, then contact a Gulf Sales Engineer for help on any problem that involves a petroleum product.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

All engine parts are reworked, inspected and then sent to the material "hold" area, where they are immersed in Gulf No-Rust FPR. This quality rust preventive cleans the finely machined surfaces and protects them from rust during temporary storage.

GULF OIL CORPORATION

GULF REFINING COMPANY

1822 Gulf Building, Pittsburgh 30, Pa.

GULF

MOTOR FACTS ON INDUSTRY'S
MOST PREFERRED "POWER PACKAGE."

Electrical System Fact—New exclusive Bondite impregnating varnish, partner to new Bondar and Mylar* insulations, guarantees complete resistance to weather. It doesn't just repel, it resists—all the way through.

*Du Pont Registered Trade-Mark

FACT:

The new Life-Line A is the most weather-resistant motor on the market

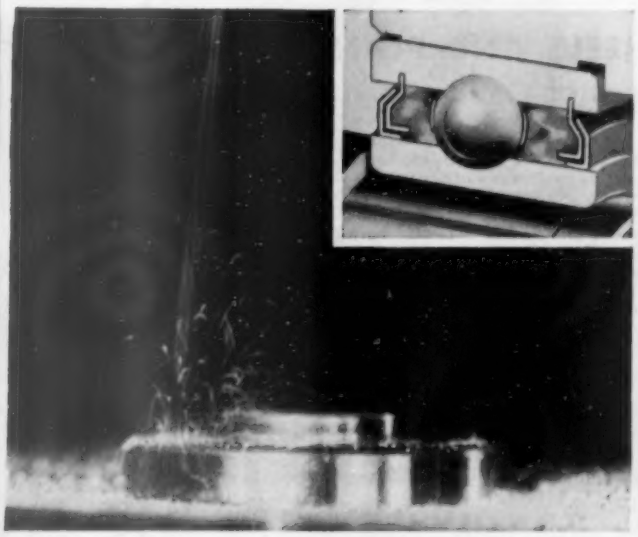
Whether your application is hot—cold—wet or dry, you'll find the new Westinghouse Life-Line® "A" motor will last longer under more extreme weather conditions than any other motor you can buy.

New insulation materials, housing designs, 4-way sealed bearings are tangible evidence of electrical, mechanical and lubrication system improvements that make Life-Line "A" industry's most preferred package of power.

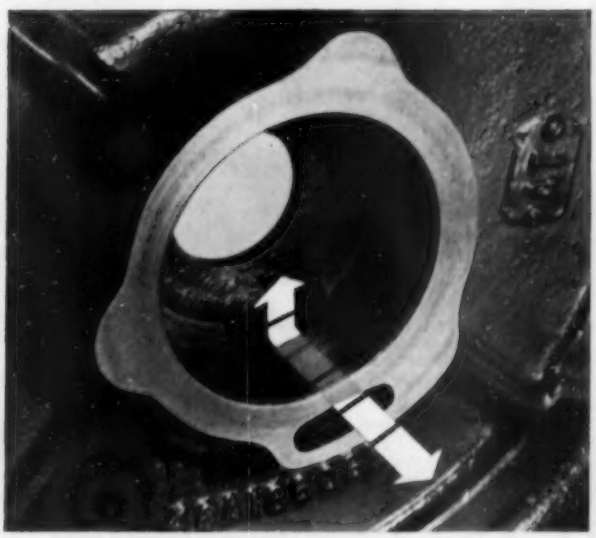
Get all the facts by calling your Westinghouse sales engineer . . .
The Man With The Facts.

J-21882

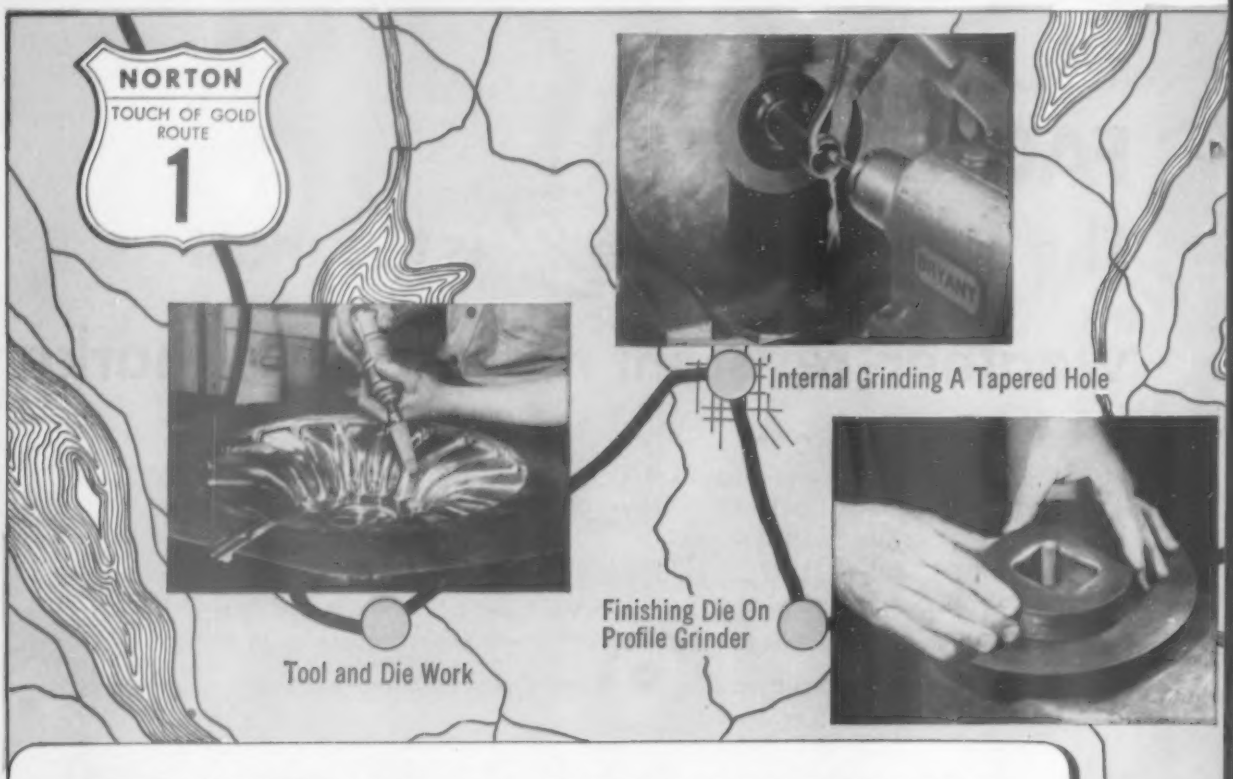
YOU CAN BE SURE...IF IT'S Westinghouse



Lubrication System Fact—Two outer seals of new 4-way sealed bearing act as flingers and literally (see photo above) throw off damaging contaminations. Inner seals, attached to outer bearing race, are stationary and form a positive labyrinth with outer seals.



Mechanical System Fact—New exclusive air by-pass on totally-enclosed motor permits the motor to breathe around the bearing—not through it—minimizing atmospheric damage. Finest grained castings used in new cast-iron housings.



YOUR "TOUCH of GOLD" ROAD MAP TO HARD-TO-REACH GRINDING SPOTS

NORTON MOUNTED WHEELS AND POINTS

bring you big savings on hundreds of small grinding jobs

Norton mounted wheels and points bring the same "Touch of Gold" grinding performance to small or hard-to-get-at areas that the big Norton wheels deliver in the "wide open spaces." Which means that every time you put one to work you get better grinding for less money. Here are some reasons why:

- ***Norton mounted wheels and points stay on their spindles — stay on TIGHT, under severest use. Norton-developed mounting techniques make sure of this.***
- ***They're trued on their own spindles, which assures: (1) perfect concentricity; (2) sharpness and fast-cutting action; (3) accuracy of dimensions and shape. They're ready to go to work immediately.***
- ***They're duplicated identically from lot to lot, thanks to Norton's statistical quality control in processing.***
- ***They're a 100% complete line, for grinding all metals and many other materials . . . made in nearly 200 standard shapes and sizes . . . in the famous ALUNDUM* and CRYSTOLON* abrasives, vitrified or resinoid bonded . . . in diamond abrasives, metal or resinoid bonded . . . and in the laminated, semi-flexible BF construction, resinoid bonded. For ultra-high speed precision grinding, special spindles and cement are available.***

Your Norton Distributor

can help you plan your profit-boosting "Touch of Gold" Route to hard-to-reach grinding spots. See him for the mounted wheels and points you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

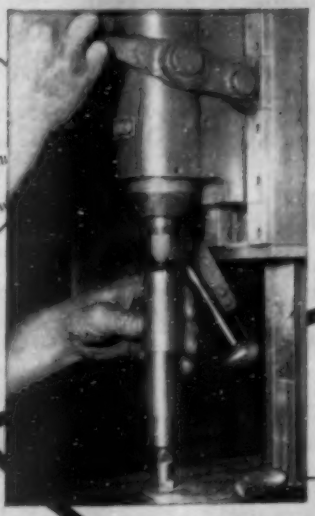
W-1648

N
W NORTON E
S

Snagging A Casting

Touching Up A Die

Finishing Up
A Punch



Lapping
Center Hole

Roughing Out
A Forging Die

to

Chamfering, Polishing, Spot Grinding, Breaking Corners,
Removing Tool Marks, Smoothing Welds, Etc.

NORTON

Making better products...
to make your products better

and its **BEHR-MANNING** *division*

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

HOW CAN THESE SKILLS OF SMALL BUSINESS HELP YOU?

JET ENGINE tail pipe is welded by Howard Sanders, foreman of General Tool's fabrication department. Typical of the initiative of many small businessmen, General Tool found a way to reduce costs in this fabrication work.

How skills developed on G-E defense subcontracts helped a small business expand production capacity

General Tool Company's steady growth, first stimulated by G-E orders for jet engine parts, offers opportunities for service to other manufacturers.

William Kramer and Harold Poe did a $1,500,000 business in Reading, Ohio, last year—50% more than their total for 1953. That's a healthy growth picture for their General Tool Company. Even more important, this growth is a sure sign of the company's value to the country, as it keeps the firm's defense potential high.

Why? Because General Tool grows bigger every year by using the skills and capacity it developed in handling G-E orders for jet engine parts. In adapting these skills to non-defense items, the company is prepared to work for other manufacturers, and, at the same time, preserves its role as a vital defense producer should the need ever arise.

BIG AND SMALL BUSINESS WORK TOGETHER. General Tool's story is an outstanding example of the results when big and small business help each other out. And Kramer and Poe were *very* small when they started in 1947. They had a bank loan, personal savings, and a corn field on the edge of town. They put up a 32′ x 70′ building, hired 6 men and went to work.

"Best break we got," partner Kramer volunteers, "was a G-E defense subcontract to make parts for jet engines. And because of the high-quality product demanded by General Electric," he says, "we hired expert personnel, bought better equipment—became a better company making finer products with faster deliveries."

TODAY, GENERAL TOOL'S PRODUCTION ranges from paper mill machinery to complex control devices for automobile assembly lines. The company's additional capacity, brought about in part by the stretch out of defense orders from the Korean peak, is fast being put to work on peacetime production. Such success in these times of change shows that when large and small businesses work with each other to produce for defense, they can also stimulate economic development in peacetime.

649-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

SMALL BUSINESS OWNERS, Harold S. Poe, left, and William J. Kramer, right started as a partnership in 1947 with 6 employees. Now, as vice-president and president respectively, they employ 112.

MORE ACCURACY on all products resulted from G.E.'s rigid requirements. Here, R. Klausing, foreman, uses precision machine specially designed by General Tool designer working with G-E engineers.

EXPANSION of General Tool Company was rapid to handle G-E subcontracts. Engineers, above, hired to handle defense work, now design tools and machines for variety of non-defense uses.

IN CORNFIELD, on outskirts of Reading, partners started the business—used personal savings, plus a bank loan to buy property, erect a 32′ x 70′ building. Total sales in 1948 were $60,268.31.

TODAY'S PLANT covers 30,000 square feet of floor space, has 112 employees, did a $1,500,000 business in 1954 and continues ready for defense production if required.

CAN SMALL BUSINESSES HELP YOU?

Thousands of small businesses, like General Tool Co., have furnished General Electric with practically every kind of skill and service as defense subcontractors and suppliers. Many of these companies have available production capacity, created in large part by the reduction of defense orders since the Korean War peak. This means that they may be able to apply their skills to help you with your production.

If you have a manufacturing problem or have work available for subcontracting, please write us on your letterhead stating in as much detail as possible the type of services or skills you require. We will be glad to suggest several small businesses who have done similar work for us and may be able to help you. Write to C. W. Bryant, Manufacturing Services Division, General Electric Co., 570 Lexington Ave., New York 22, New York.

right now...

Swaged Hose Assembly Service

....AT YOUR WEATHERHEAD

DISTRIBUTOR

ANY HOSE ASSEMBLY MADE IN 3 MINUTES

Right in His Own Service Shop

Now, for the first time, your Weatherhead distributor offers you complete swaged hose assembly service right in his own shop. No waiting for shipments of factory-finished hose assemblies. No need for costly downtime and delay. Equipped with the new Weatherhead swaging press and the complete line of Weatherhead hydraulic hose and hose ends, your distributor is prepared to supply you with any size, type and length hose assembly at once.

Wherever you are, whatever your need, there is a Weatherhead distributor strategically located to give you immediate stand-by swaged hose assembly service.

WEATHERHEAD LEADS THE WAY

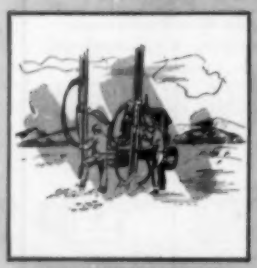
now available

at Weatherhead Distributors

ON-THE-SPOT SWAGING SERVICE FOR HYDRAULIC HOSE ASSEMBLIES

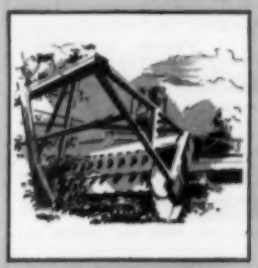
Any Size . . . Any Type . . . Any Length . . .

The complete range of sizes from ¼" to 2" I.D. in the Weatherhead full line of hose and hose ends, eliminates any delay in completing the job. Be assured of safe, trouble-free service by specifying Weatherhead for all your hose assembly needs. The Weatherhead complete line of fittings and hose is as near as your phone. Call your local Weatherhead distributor today for immediate service.



RIGHT AWAY SERVICE
For mining and oil drilling fields.

RIGHT AWAY SERVICE
For all types of manufacturing operations.



RIGHT AWAY SERVICE
For construction and farm machinery.

RIGHT AWAY SERVICE
For hydraulic materials handling equipment.

Turn the page

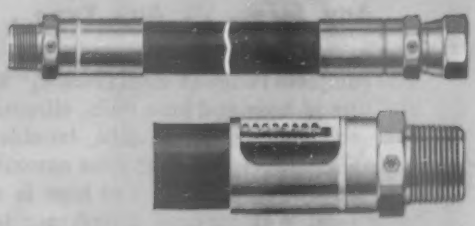
WEATHERHEAD

WEATHERHEAD DISTRIBUTORS

Your reliable source for "RIGHT-NOW" Hose Assembly Service

Weatherhead swaged hose assemblies match factory-made assemblies in every respect. They are available in any quantity, length, type or size to meet your needs. Now made-to-order hose assemblies are available at once through your local Weatherhead distributor at no additional cost. Your downtime is cut to a matter of minutes because your order can be made up on Weatherhead swaging equipment right in your Weatherhead distributors own service shop.

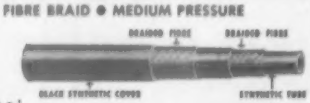
Take advantage of your Weatherhead distributor's dependable RIGHT-NOW hose assembly service. Save money. Reduce downtime.



TYPES OF HOSE

H-17 TWO FIBRE BRAID • MEDIUM PRESSURE

sizes: ¼" to 1" I.D.
working pressures: 550 to 1250 p.s.i.



H-104 ONE WIRE BRAID • MEDIUM PRESSURE

sizes: ¼" to 1" I.D.
working pressures: 1250 to 2500 p.s.i.

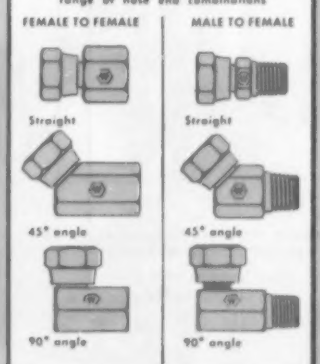
H-425 TWO WIRE BRAID • HIGH PRESSURE

sizes: ¼" to 2" I.D.
working pressures: 1250 to 4500 p.s.i.

TYPES OF HOSE ENDS

SWIVEL ADAPTERS

These swivel adapters permit a wide range of hose end combinations



WEATHERHEAD LEADS THE WAY

WEATHERHEAD . . . your only complete "single-source" Hydraulic Hose and Fitting Line
. . . FIRST IN COMPONENTS FOR HYDRAULIC SYSTEMS

An INDUSTRIAL HOSE for every need — low, medium-high and high-pressure applications; in complete size ranges to 2" I.D.; suited for any service condition.

REUSABLE HOSE ENDS for fast assembly and positive, leak-proof connections. Rugged construction that cuts costs through repeated use. Designed to insure maximum flow.

ERMETO® reusable hose ends for connecting hose assemblies directly to block or manifold are also available from stock in standard sizes. Specified by major diesel manufacturers for high-pressure fuel injection lines.

Only Weatherhead gives you hose ends with extra-long gripping area for dependable performance under high pressures.

ERMETO® fittings in steel and stainless steel for leakproof seals without flaring, threading or welding. Withstand shock loads, vibration and impulse at highest pressures. Ermeto connections can be uncoupled and reassembled time after time.

37° FLARED STEEL FITTINGS conform fully to J.I.C. standards. Available in all types and sizes with tube or dry seal pipe thread outlet.

BRASS FITTINGS—S.A.E. 45° flare, compression, inverted flare, double compression (threaded sleeve), are machined from extruded stock, giving strength equal to forgings. Large, flat wrench pads provide easy gripping for fast assembly, even in hard-to-reach places.

There's an experienced Weatherhead field engineer ready whenever you need him to help you take full advantage of all that Weatherhead offers.

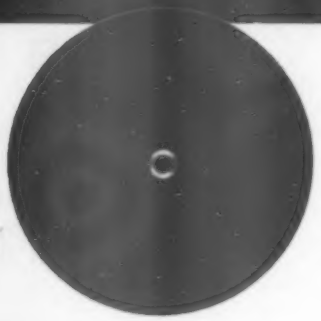
THE WEATHERHEAD CO., FORT WAYNE DIVISION
DEPT. G-10 , 128 WEST WASHINGTON
FORT WAYNE, INDIANA

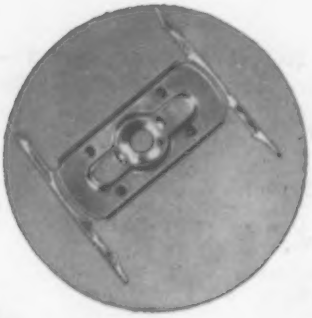
SEND FOR FULL DETAILS TODAY!

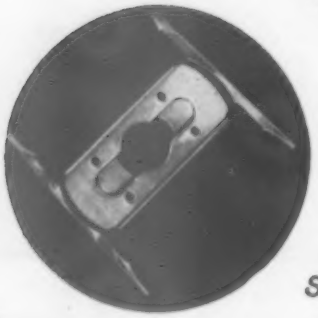
The Weatherhead Co., Fort Wayne Division
128 West Washington, Fort Wayne, Indiana
Send full details on your Distributor's stand-by swaged hose assembly service.

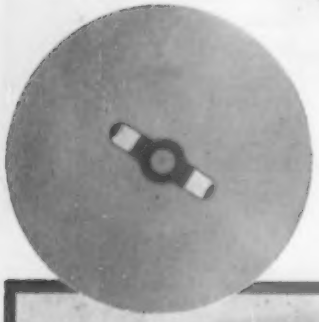
Company_____
Address_____
Your Name_____

How to mechanize with change in mind





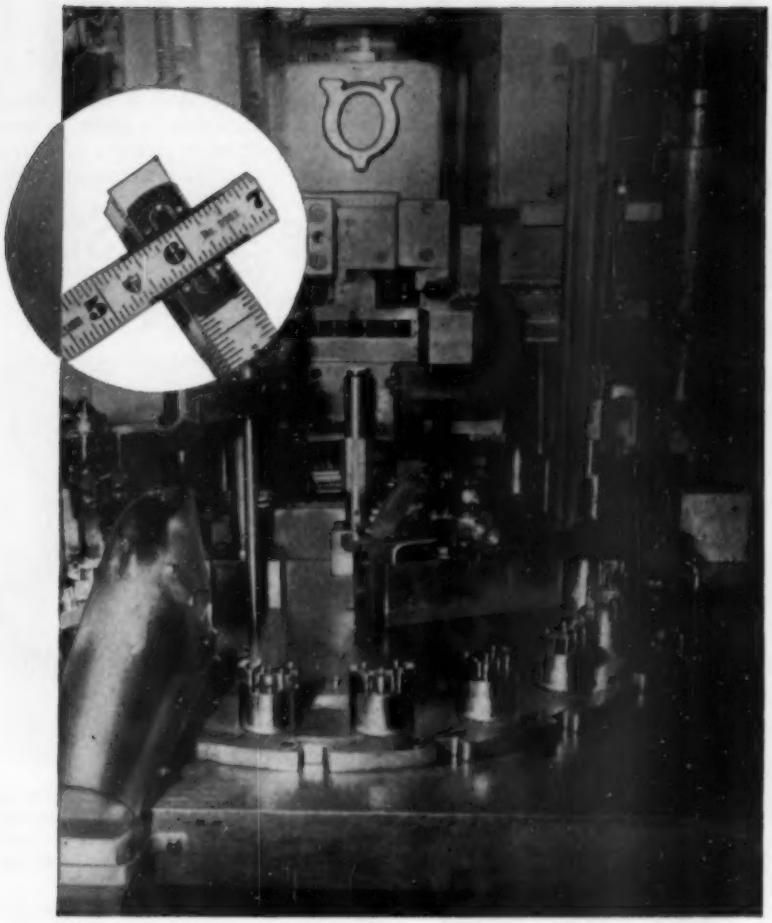




TOOLING for production of small parts like the folding rule joint shown above can be made with confidence when the basic machine is a precise, sturdy V&O press.

Package handling equipment by Standard-Knapp features adaptability. Case sealing unit, for example, self-adjusts to different sizes of shipping cases.

Demand production of metal stampings is practical with Henry & Wright Dieing Machines. Their high speed and versatility assures quick completion of simple or tricky parts.



EMHART

S-K

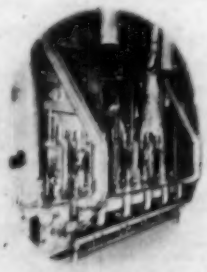
EMHART MFG. CO., HARTFORD 2, CONNECTICUT

Western representative: MAILLER SEARLES, INC., Los Angeles and San Francisco

Only the best is good enough

Because Emhart machines will do more than one thing, you can mechanize operations and retain adaptability to change. Our condensed catalog of over 275 machines tells more.

By easy changes Hartford-Empire forming machines produce bottles and jars ranging from the smallest to the largest at high speeds and low cost.



EMHART MFG. CO.
HARTFORD 2, CONN.

Please send your condensed catalog of Emhart machines.

Name_____

Company_____

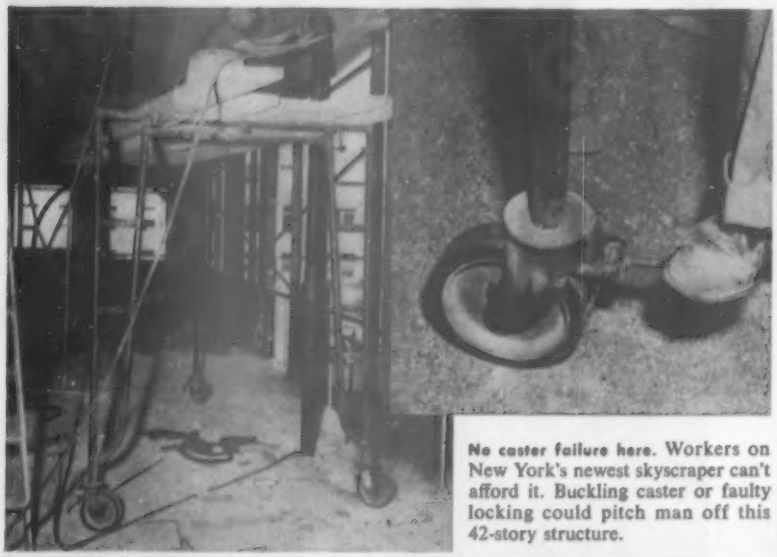
Street address_____

City_____ Zone____ State_____

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

40 stories above 42nd St. casters and locks can't fail!



No caster failure here. Workers on New York's newest skyscraper can't afford it. Buckling caster or faulty locking could pitch man off this 42-story structure.

Riding high with Bassick

Bassick casters lend a hand as the world's largest steel-sheathed (also the largest fully air conditioned) building climbs skyward at Lexington and 42nd in New York.

Handling mobile workmen's scaffolds on the unwalled edge high above the street calls for the safest, sturdiest casters money can buy. No wonder it's heavy-duty "S99" Bassicks you see above. Designed to stand the abuse of power-pulled trucks and assembly line dollies, they swivel easily and roll surely over rough flooring where a sudden lurch or buckling could spell disaster. Extra-heavy king pins provide unusual strength needed for loads up to 1500 lbs. each, while positive Bassick position locks keep wheels from rolling, hold the scaffolds securely in place.

Bounceless caddy-carts for aircraft engines

Fairchild dollies for precision aircraft engines use four 10-inch dual wheel Floating Hub Bassick casters to prevent damaging shock.

Individually sprung wheels absorb both vertical and horizontal shocks. Vibration frequencies are interrupted and immediately damped out by Bassick's inherent snubbing action to guard against resonance and fretting corrosion.

New super-heavy, economical formed-steel "S99" casters

Double-ball-race design makes swivelling easy. Grease retainer cup and Alemite fittings aid lubrication. Plunger-type swivel lock available. Tough, heavy steel (¼" thick) provides extra strength. Fully hardened cold-formed steel raceways, extra-heavy king pin insures long life.

Rigid casters, too, team up with swivel models to meet every materials-handling application. "S99" Bassicks take loads up to 1500 lbs. each.

Quick-change artist

Here's a pony express — 1955 style. When Greyhound buses need fresh horsepower the special Bassick-equipped mobile mounting device you see above slides under the back end of the bus and rolls away the entire engine for repairs.

A fresh engine from stock is guided back into position the same way, connected in place — and the Greyhound is ready for another lap across country.

Job of handling the Greyhound's heavy expensive engines goes (naturally) to Bassick extra-heavy-duty "S99" casters.

Overweight wagon designed by Fairchild to move extremely heavy press dies, rolls easily on big, grooved wheel extra-heavy-duty Bassick casters.

Check your Bassick Distributor

He has many standard casters in stock. He is in business to serve you . . . call him when you want casters and wheels.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER

The Results of this Important Research Project are basic to every man who faces a Rust Problem

RUST-OLEUM
A CORPORATION
STOPS RUST!

CHICAGO · MILWAUKEE · NEW YORK · EVANSTON · LOS ANGELES · SAN FRANCISCO
EVANSTON · ILLINOIS

September 16, 1955

SUBJECT: Special Report to Industry

It is generally recognized by engineers and corrosion experts that there is far more to stopping rust on a rusted surface, than just applying any type of material at a certain film thickness. Dry film thickness of a protective coating is important--but, it's what goes on UNDER the film surface that counts, too. The vehicle of the coating that's applied over rust must penetrate to bare metal, driving out the air and moisture that, in presence of metal, cause rust.

Rust-Oleum users, for over thirty years, have known that Rust-Oleum does exactly that through practical use and results of the application of the product. However, Rust-Oleum wanted to go even further in bringing you irrefutable proof of this penetration.

With this in mind, the Rust-Oleum Corporation consulted with technologists from the Battelle Memorial Institute in Columbus, Ohio, who conducted this important research project, utilizing radioactive tracing technique with C^{14} radioisotope to measure Rust-Oleum penetration. Now, after nearly three years of continued research, you can actually look UNDER the surface film and see how the Rust-Oleum specially-processed fish oil vehicle penetrates rust to bare metal.

The methods and results of this research, which are outlined on the following pages, are given in their entirety in a thirty-page report entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens," prepared by Battelle Memorial Institute technologists. It is available to you without cost or obligation by request on your business letterhead.

Very truly yours,

RUST-OLEUM

Robert A

President

RAF/jc

Now! For the first time, actually look *under* the surface of the coating! See Rust-Oleum *penetrate rust* to bare metal through the "eyes" of radioactivity!

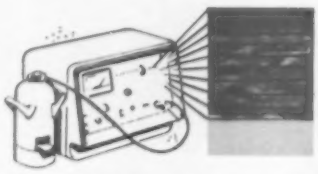
(A RUST-OLEUM REPORT TO EVERY PERSON FACED WITH A RUST PROBLEM)

Nearly three years of research, utilizing radioactive tracing with C^{14} radioisotope, enables you to follow Rust-Oleum penetration through the heretofore "unseen" rust area to bare metal. While Rust-Oleum users, for over thirty years, have known that Rust-Oleum penetrates rust to bare metal when applied over rusted surfaces—Rust-Oleum wanted to go even further in bringing irrefutable evidence of this penetration to you.

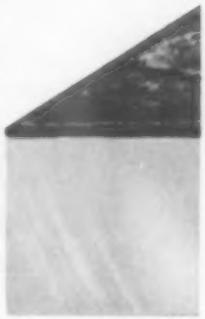
The methods and results, on which the technical information on these pages is largely based, are presented in a complete thirty page report entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens," prepared by Battelle Memorial Institute technologists. Request your copy on your business letterhead without cost or obligation.

1 To trace Rust-Oleum penetration through rust, the Rust-Oleum fish oil vehicle was made radioactive with C^{14} radioisotope. The radioactive Rust-Oleum fish oil vehicle was then formulated into Rust-Oleum 769 Damp-Proof Red Primer without changing Rust-Oleum's exclusive formulation or performance of product.

2 Rusted metal test panels were scraped and wirebrushed to remove rust scale and loose rust, according to Rust-Oleum's standard directions for application. The radioactive Rust-Oleum 769 Damp-Proof Red Primer was then brushed on directly over the remaining rust on these rusted test panels and allowed to dry.



3 Then—the surfaces of the rusted panels were shaved at approximate half-mil levels and Geiger Counter readings of Rust-Oleum penetration (radioactivity) were taken at each level down to bare metal. These measurements are shown as "Percentage of Surface Radioactivity" figures on the graph on the opposite page.



Dry film thickness of a coating is important, but, what goes on UNDER the film surface is vitally important, too, in the stopping of rust. Rust-Oleum Stops Rust, because it penetrates the rust to bare metal. The Rust-Oleum fish oil vehicle works around the rust particles and through the fissures and crevices in the rust formation to the bare metal. It doesn't "bridge-over" the tiny, microscopic pits in the metal—BUT, actually goes into these pits to drive out air and moisture and coat the metal with a penetrating, low-surface-tension film that expands and contracts with the metal. Because of this unusual penetration, you can apply Rust-Oleum 769 Damp-Proof Red Primer directly over the rusted surface after scraping and wirebrushing to remove rust scale and loose rust. Thus—you save time, labor, and money as costly surface preparations are usually eliminated.

From tanks, girders, machinery, roofs, sash, stacks, pipes, wire fences, and building maintenance in industry . . . marine, farm, or railroad applications . . . to gutters, metal sash, lawn furniture, etc. around the home . . . Rust-Oleum is the modern way to Stop Rust and beautify as you protect, in your choice of Red, White, Black, Aluminum, Gray, Green, Yellow, Blue, etc. May be applied by brush or spray and dries to a firm, *decorative* coating that resists salt water, salt air, heat, fumes, sun, humidity, and weathering. Industrial users see Sweets for complete catalog and nearest Rust-Oleum Distributor, or attach coupon on the opposite page to your business letterhead for complete information, including your thirty-page report on Rust-Oleum penetration. Homeowners will find Rust-Oleum featured at leading Hardware, Paint, and Lumber dealers in most localities.

there is only one Rust-Oleum . . . *it is distinctive as your own fingerprint*

RUST-OLEUM®

Rust-Oleum is exclusive. It incorporates a specially-processed fish oil vehicle that penetrates through rust to bare metal. It dries right and is free of objectionable odor. Many attractive colors.

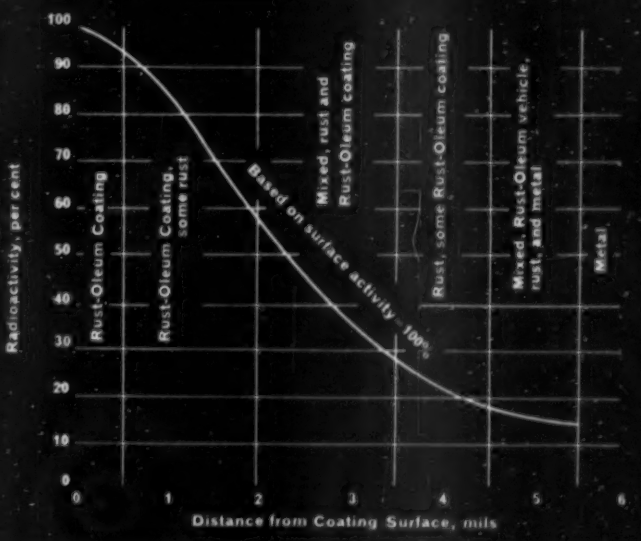
STOPS RUST!

A new Rust-Oleum development is the Rust-Oleum Galvinoleum coating. It sticks to new or old galvanized surfaces *without* etching, *without* weathering. Available in red, gray, green, metallic.

Photomicrograph (enlarged 250 times) of cross-section of rusted metal coated with Rust-Oleum.

Actual unretouched photomicrograph (enlarged 250 times) showing cross-section of rusted metal coated with Rust-Oleum. Geiger Counter readings were taken at each half-mil level down through the rust—tracing Rust-Oleum penetration through rust to bare metal.

Graph (at right) shows Geiger Counter recordings of Rust-Oleum penetration. Visible evidence of Rust-Oleum penetration as recorded by Geiger Counter and Gas Flow Proportional Counter is shown on graph. Rust-Oleum penetration is expressed in terms of "Percentage of Surface Radioactivity" figures at given mil levels. Note how Rust-Oleum pigment and fish oil vehicle combined penetrate to approximately four mils—then the fish oil vehicle penetrates through remaining rust to bare metal.



GET THE COMPLETE STORY. ATTACH TO YOUR BUSINESS LETTERHEAD FOR YOUR COPY OF THIS THIRTY-PAGE REPORT WITHOUT COST OR OBLIGATION.

Rust-Oleum Corporation
2980 Oakton Street, Evanston, Illinois

☐ Please send me without cost or obligation, the Rust-Oleum thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings On Steel Specimens," as prepared by Battelle Memorial Institute technologists.

☐ Complete literature and color charts.

☐ Nearest source of supply.

...there is only one Rust-Oleum...it is distinctive as your own fingerprint

RUST-OLEUM IS EXCLUSIVE. Most manufacturers of protective materials specify that rusted metal surfaces must be free of rust before applying their product. Rust-Oleum does NOT! With Rust-Oleum you simply scrape and wirebrush to remove rust scale and loose rust —then brush Rust-Oleum 769 Damp-Proof Red Primer directly over the remaining rust. The specially-processed fish oil vehicle penetrates rust to bare metal, merging the rust particles into the coating. It dries to a firm, decorative coating that resists salt water, salt air, heat, fumes, humidity, sun, moisture, and weathering. This unusual penetration saves you time, labor, money, and metal because sandblasting, chemical pre-cleaning, and other costly surface preparations are usually eliminated.

AVAILABLE IN *MANY COLORS.* You beautify as you protect because Rust-Oleum is available in many, many attractive colors including Aluminum, White, Black, Green, Red, Gray, Orange, Yellow, Blue, etc. In addition to industrial rust preventive coatings, Rust-Oleum finish coatings, incorporating the same specially-processed fish oil vehicle, are available (1) to match original equipment manufacturer's colors for farm and road and highway construction equipment, (2) Oil Field finishes to match original equipment colors for rigs, pumps, etc., (3) Restful Colors for plant and institutional interiors, (4) Special Marine and Railroad finishes, (5) Heat Resistant and Chemical Resistant finishes, (6) Masonry and Floor Coatings.

RUST-OLEUM®

Remember—Rust-Oleum's unusual rust-resistant qualities enable you to apply Rust-Oleum 769 Damp-Proof Red Primer one season—and wait until the following season to use your Rust-Oleum finish coating. Thus—you "stretch" maintenance budgets season-to-season.

STOPS RUST!

Write on your business letterhead for your copy of the special Rust-Oleum thirty-page report, entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens." We'll be glad to send it to you promptly, and there is no cost or obligation.

Rust-Oleum Corporation • 2980 Oakton Street • Evanston, Illinois

ONE wide-range "OXWELD" W-45 BLOWPIPE handles EVERY welding and heating job

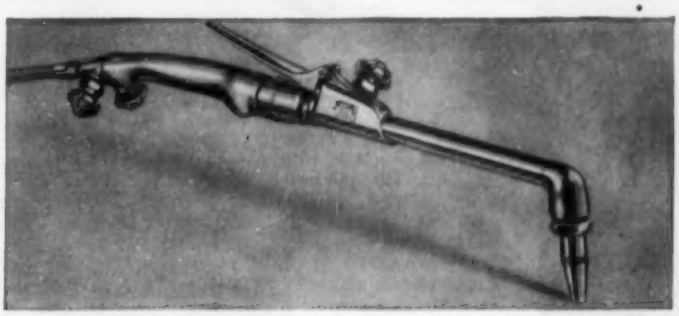
Trade-Mark

*NO OTHER SINGLE BLOWPIPE OFFERS THIS **EXTENSIVE RANGE!***

Anyone whose daily work includes welding and heating will readily appreciate the amazing wide range and versatility of the new OXWELD W-45 Blowpipe. Its 18 head sizes (2 to 300 cu. ft. per hr. capacity) provide a perfect flame for every metal thickness. Light sheet to heavy plate, *one blowpipe does it all!*

From chrome-plated tip to offset hose connections, the W-45 shows the results of over a decade of development work by LINDE engineers. Its exclusive "jiffy-lock" heads, "form-fit" handle, and advanced styling are as modern as guided missiles and atomic power. "O" ring gas seals, flame-stabilizing mixers of improved type, and many other innovations put this blowpipe far ahead of the field in economy, ease of operation, and low-cost maintenance.

See for yourself how you can enjoy tomorrow's operating standards today with an OXWELD W-45 Blowpipe. Ask your LINDE representative for a demonstration, or write for free booklet, F-8684.



CW-45 Cutting Attachment adapts the W-45 Blowpipe for cutting steel up to 8 inches thick.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

Linde Trade-Mark

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

...quick "pick-up" cures
materials handling headache
You're looking at the "pick-up" point of a Dracco "Airstream" Conveyor. Here powdered raw materials are selectively drawn from storage tanks by Dracco Rotary Feeders and rushed to processing units thru the completely enclosed conveying line. This is done automatically with one-man supervision . . . there's no costly manual handling, no material loss from spillage or broken bags, no spoilage by moisture or contamination. Buying in bulk provides added savings.
Dracco's quick "pick-up" solved a bothersome problem of how to move talc, ball clay and flint from storage to process at an Alabama ceramic plant. Incidentally, these materials are unloaded from railroad cars to storage with similar efficiency by another Dracco "Airstream" system.
It's another example of how to cut handling costs with "Airstream".
DRACCO CORPORATION
4075 East 116th Street • Cleveland 5, Ohio
Dracco Bulletin 529 presents complete information on handling your bulk materials pneumatically. Write for your copy today.
DRACCO
Performance Proved
Airstream CONVEYORS · DUST CONTROL EQUIPMENT

PERCENT

Dracco Multi-Bag Filter installation recovers tons of valuable dusts daily . . . eliminates costly material waste and plant clean-up problems.

Dracco dust recovery ends waste

To prevent feeding the plant atmosphere and wasting valuable feed additives, International Minerals and Chemical Corporation has installed a Dracco Dust Recovery system at its Bartow (Fla.) plant.

International has found the Dracco system a profitable solution which pays off in dollar savings from valuable dust recovery, plant cleanliness, and better working conditions.

The Dracco system traps all processing dust at its source—at screens, hoppers, elevators, transfer points and bag loaders. This dust is collected in two large Dracco Multi-Bag Filters which operate at 99½%-100% efficiency. All recovered materials are returned to process.

Uncontrolled dust in your plant is an unnecessary expense . . . and may be wasting valuable materials. To convert your dust problem to profits, call in a Dracco engineer today.

Dracco 40-page Bulletin 800 contains complete technical information on "Industrial Dust Control and Recovery" Write for your copy today.

DRACCO CORPORATION

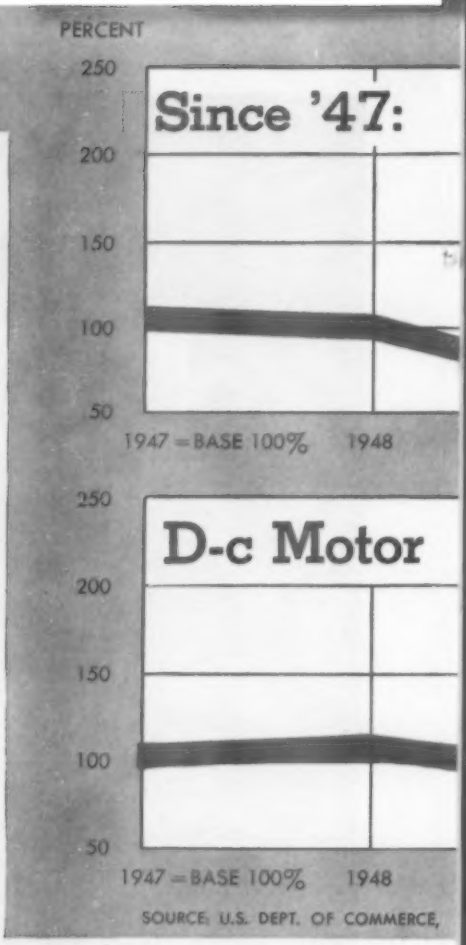
4075 East 116th Street • Cleveland 5, Ohio

DRACCO *Performance Proved*

Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

PROGRESS IN DIRECT CURRENT DRIVES

- U.S. industry is trending to automatic processes and machines . . .
- And statistics show a big upswing in d-c motor purchases.
- General Electric meets demand for high-output production equipment.



AUTOMATIC MACHINES like this boring mill use d-c drives for accurate speeds, faster output. Irregular, three dimensional shapes are machined automatically to close tolerances.

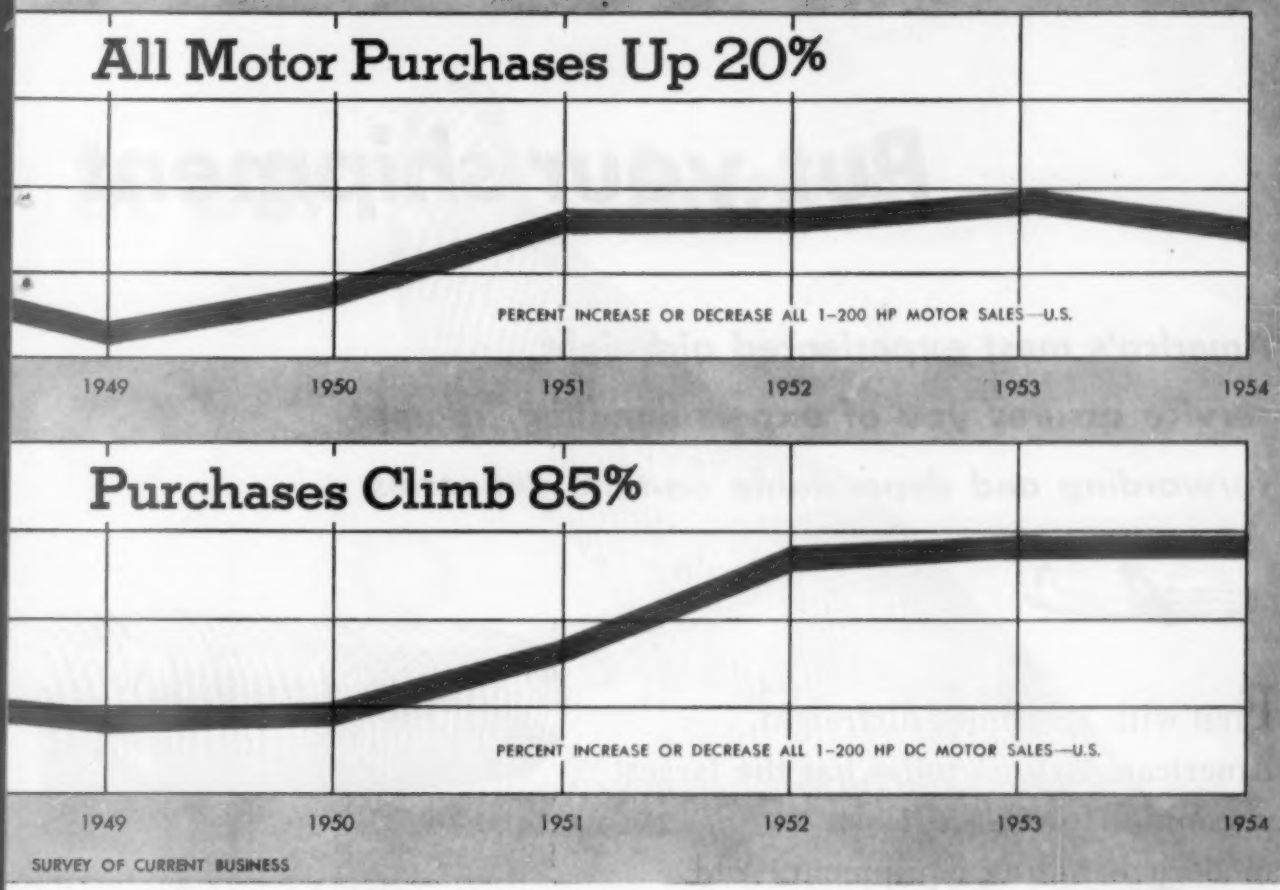
D-c Drives:

U.S. industry is moving steadily toward mechanization, automatic machines and processes—to produce more and better goods. As a result, new and unique methods of mass production are constantly being developed.

Statistics show this trend to more automatic means of production is increasing the demand for direct-current drives (graphs).

• **Reasons**—Industry has a tough job ahead. If it is to meet an increased demand for goods and services of at least 40% by 1964, with a predicted increase of less than 13% in work force, further mechanization and more continuous processing is necessary. D-c equipment provides the versatility and sensitivity required to meet future high productivity levels.

• **Why D-c for Automatic Processing?**—Thousands of recent applications dramatically show why d-c drives are ideal for automatic and continuous processes. For instance, in manufacturing rubber-coated tire fabric, the process begins with a multitude of cord spools unwinding at high speeds. After racing through several



The Answer to Automatic Production

different processes, each requiring varying rates of speed, the completed product is wound up on another set of spools. The entire operation, driven by adjustable speed d-c equipment, is automatic—from start to finish.

• **Adjustable Speed**—The drive for this production line must do two things: 1. Adjust operating speeds at various stages of the process for proper cord tension. 2. Adjust speeds to accommodate a variety of cord sizes and types. The ability to meet these demands—fast and accurately—explains the trend to direct-current motors. There is no device yet discovered that is a better, more universal source of precisely controlled adjustable speed.

• **D-c Power Readily Available**—Although few utilities supply d-c power directly, the many advantages of d-c drives should not be ruled out when considering expansion or modernization. With packaged conversion equipment—rectifiers or motor-generator sets—d-c power supply is readily available. For instance, G-E Speed Variators convert incoming a-c power to d-c in compact cabinets which install next to driven machinery or in any convenient load-center location.

• **Cost Factor**—Although the initial investment for this type of electrical equipment is usually higher than for constant-speed drives, the versatility of direct-current drives often increases machine output and quality of finished product to such an extent that over-all investment per unit of production goes down—not up.

• **Notable Examples**—D-c electronic printing-press drives add production flexibility to make practical speeds of up to 210,000 newspapers per hour. In the steel industry d-c driven cold-strip mills accelerate to full speed in 10 seconds and deliver steel strip at over 70 miles per hour. D-c log-carriage drives give the lumber industry high speed operation and fingertip control for increased board feet per hour production. D-c adjustable-voltage shovel drives enable modern shovels to move up to 60 cubic yards per bite. In the paper industry d-c sectional paper machine drives provide operating flexibility needed for high-speed, uninterrupted production of quality paper.

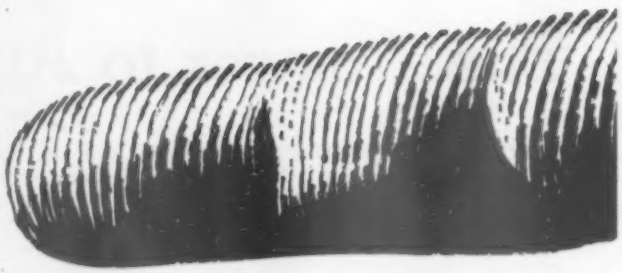
• **New Developments**—G-E engineers are working constantly on the development of new d-c drives to meet demands of U.S. industry for faster, more automatic, more continuous production.

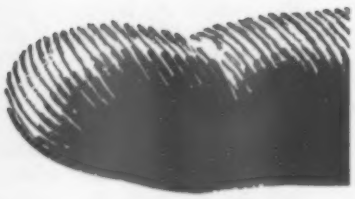
• **Industry-wide Applications**—D-c drives are boosting output in industries throughout the country. Companies desiring higher production can obtain equipment selection and application help from engineering specialists in 149 conveniently located G-E Apparatus Sales Offices. *Direct Current Motor and Generator Department, General Electric Company, Erie, Pennsylvania.* 818-1

GENERAL ELECTRIC

Put your shipment

America's most experienced airfreight service assures you of expert handling, prompt forwarding and dependable on-time deliveries





First with scheduled airfreight, American Airlines today has the largest personnel force, the most modern handling equipment. Add this edge in experience and facilities to American's superiority in coverage and capacity and you'll readily see why American Airlines is better qualified *than any other carrier* when it comes to solving shipping problems and cutting distribution costs. American Airlines, Inc., Cargo Sales Division, 100 Park Avenue, New York 17, New York.

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America's Leading Airline

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SAN ANTONIO
TO MEXICO CITY

"SKIL Drills...

stay on the Job twice as long"

says **George Behling,** Superintendent
The Day Company
Minneapolis, Minnesota

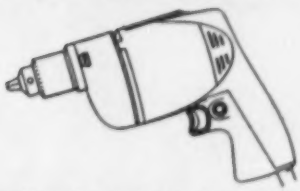
"Nothing is so irritating as to have a unit fail on the job," according to Mr. Behling. "In our business, grain and cement dust are a constant source of electric tool failure. With SKIL Model 75 Drills, however, we have far less trouble than with any other make.

"Our mechanics prefer SKIL Drills. They have extra power and are easier to handle. One other plus feature is the service we get from the local SKIL people, when needed. Our choice of electric drills is SKIL, for long life—ample power and ease of handling."

THESE ARE SOME OF THE MODEL 75 FEATURES THAT MAKE SO MANY FIRMS CHOOSE SKIL

- **Large inspection plate for routine maintenance.**
- **Choice of 7 speeds (500 to 5,000 r.p.m.)**

- **Comfortable, "Contour-grip" handle.**
- **All anti-friction bearings for longer life.**



- **Handy, safety-designed trigger lock for continuous operation—side location for easy use.**
- **55% more powerful, yet lighter in weight.**

When you buy a drill, be sure it's a SKIL.

SKIL
PORTABLE TOOLS
Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
5031 Dundas Street West, Toronto 9, Ontario
Factory Branches in ALL Leading Cities

FREE! Send this coupon. Your SKIL Distributor will give you a no-obligation demonstration. See how you can increase performance with Model 75 SKIL Drill.

SKIL Corporation, Dept. FM-105
5033 Elston Avenue, Chicago 30, Illinois

☐ I would like a demonstration and FREE trial.
☐ Please send literature on SKIL Drill.

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MOTOR CONTROL FACTS
ON INDUSTRY'S
MOST COMPLETE LINE

FACT: Here is industry's newest and most advanced high-voltage starter!

This new line of Westinghouse high-voltage fused starters offers industry more protection—more operating simplicity than any other. Here are a few reasons why:

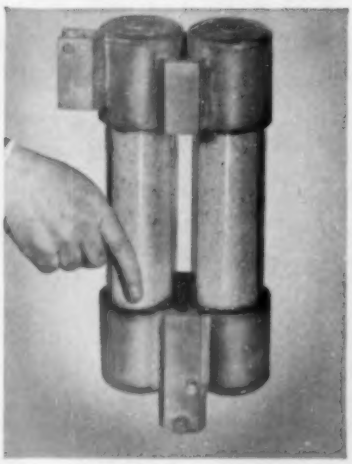
Extension of the BAL fuse line up to 400 amperes with the first and only 400-ampere, double-barreled, single-unit fuse; a new 50,000-kva air break contactor featuring the most advanced arc interrupting action yet developed; and new enclosures providing new levels of convenience and safety.

Booklet B-6535 has more facts on this outstanding new starter. Get it from your Westinghouse engineer —or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

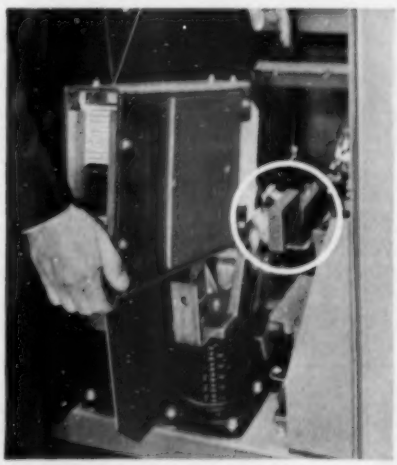
J-21898

YOU CAN BE SURE... IF IT'S

Westinghouse



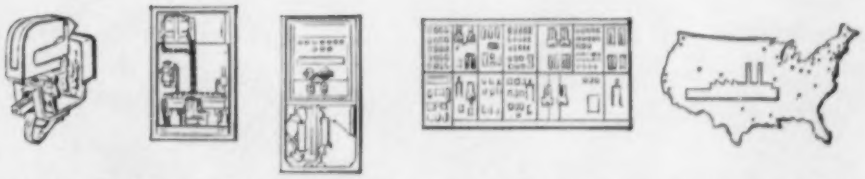
New 400-ampere, double-barreled, type BAL fuse features "no-bolt" brazed connections which insure equal division of current. Complete coordination of fuses is assured. Exclusive BAL single-barreled design for fuses up to 200 amperes is retained.



New air break contactor (200 and 400-ampere sizes) features a unique arc chute design which greatly simplifies inspection and maintenance of the contacts. Simply pull the arc chute down —contacts are immediately and conveniently accessible.

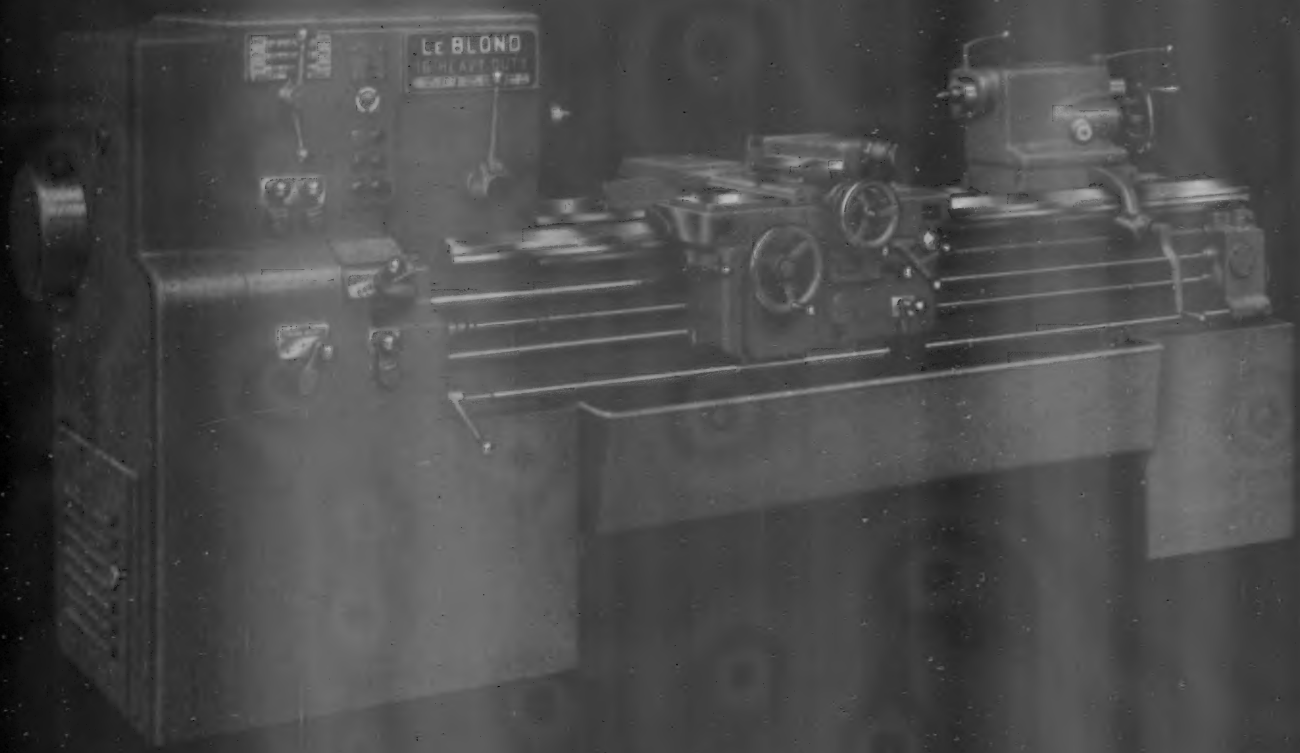
New enclosure design provides both mechanical and electrical interlocks; front and rear access DOORS; top-mounted bus arrangements; separate compartmentation of high and low-voltage components—all designed for maximum safety of personnel.

FROM INDUSTRY'S MOST COMPLETE LINE OF INDUSTRIAL CONTROL



CONTROL COMPONENTS • MOTOR CONTROL • ELECTRONIC CONTROL • CONTROL SYSTEMS • NATIONAL SERVICES

cut with confidence . . . **HERE'S THE**



New LeBlond 16" H.D. Heavy-Duty Lathe

NEW LeBLOND

16" HEAVY DUTY

stamina plus with precision

LeBlond heavy-duty engine lathes have always been known for their outstanding stamina—the inherent ability to stand up to the toughest turning jobs with precision, year after year. Our new 16" Heavy Duty is the most rugged, yet precise machine of its class that we've ever built!

The new headstock uses our proven combination gear-belt drive to give you a complete range of 27 spindle speeds from 16 to 2000 rpm chosen by direct-reading color plate. You get maximum power and smoothness from the 20-hp motor whether you're roughing or finishing—18 speeds are gear driven; 9 higher speeds are driven through a positive Gilmer-type belt that requires no adjustment. Free-running spur gear design assures minimum no-load friction horsepower . . . shafts and gears not needed for a given speed remain idle, do not consume power uselessly.

For a new degree of speed and convenience, a single lever controls the four-way power rapid traverse built into the apron. Both length and cross feed through a positive-jaw clutch are controlled by a single lever. Lubrication is entirely automatic. Bedways are hardened and ground steel inserts fitted to LeBlond's compensating veeway principle for better distribution of cutting forces. Quick-change box is totally enclosed. New tailstock uses the exclusive LeBlond thrust-lock design with a quick-set length dial.

For consistent and precise production, you can't do better than the new LeBlond 16" Heavy Duty. Call your nearby LeBlond Distributor or write for Bulletin HD-126A.

. . . cut with confidence

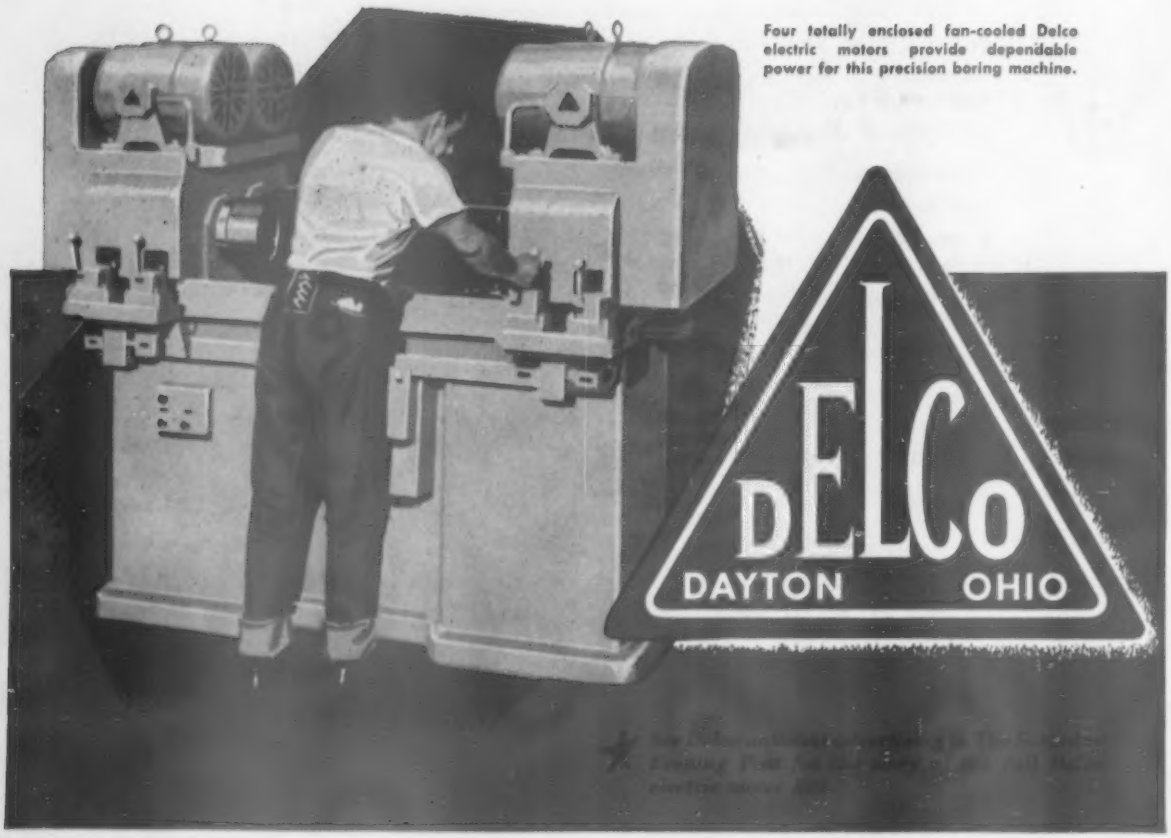
THE R. K. LEBLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

LeBLOND *of Cincinnati*

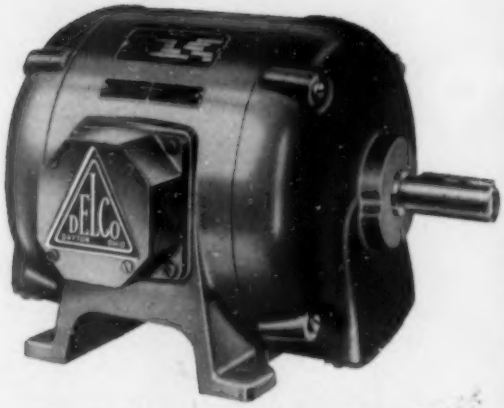
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 68 YEARS*

dependable power...

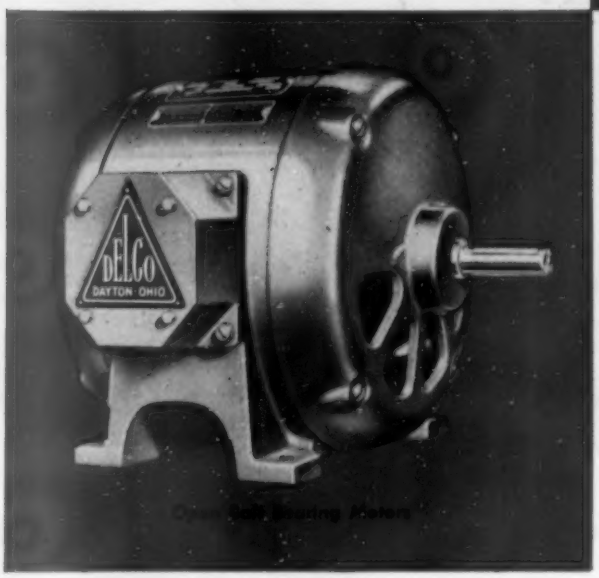
DELCO
Electric Motors



Four totally enclosed fan-cooled Delco electric motors provide dependable power for this precision boring machine.



Open Ball Bearing, Drip-Proof Motors



Totally Enclosed Fan-Cooled Motors

You can always depend on Delco for job-fitted electric motors. Wherever you are, whatever your power needs, just pick up your phone and call us.

Every Delco motor is backed by unsurpassed research facilities and manufactured to rigid standards of workmanship. Then it is carefully tested and inspected before shipment.

But our responsibility doesn't stop there. We'll put Delco engineers right in your plant . . . at your request . . . to work with your engineers on applying the best motor to the job. Delco delivery is always prompt. Delco service is always fast and dependable. For reasons such as these, *wherever electric motors are used, you'll find Delco preferred.*

GM GENERAL MOTORS DELCO

DELCO *Electric* MOTORS

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS, DAYTON, OHIO

Proved best by Performance!

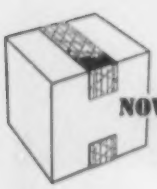
Close center seams only, with rayon reinforced Snake Tape, because it . . .

seals cartons 3 times faster, stronger!

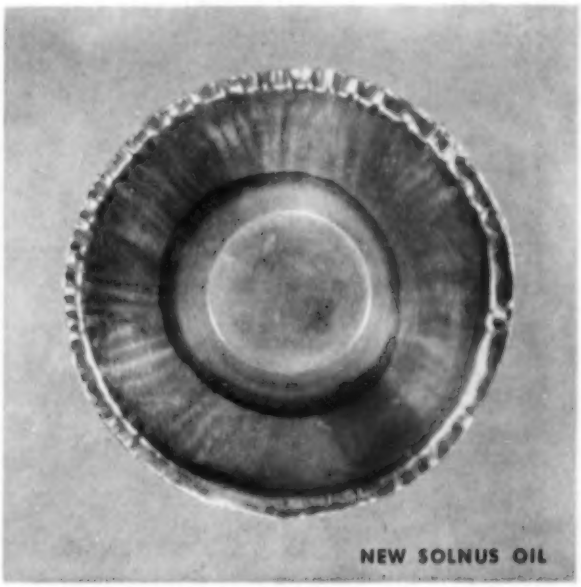
If you think of yourself as a cost-cutter, think what the Snake Tape Idea can do for you!

Sealing cartons with two strips instead of six saves time! Because *rayon* reinforced Snake Tape is so strong you get a *stronger* closure and you eliminate damage claims due to tape failure. Those RAYON yarns actually *absorb* shock just as rayon-reinforced auto tires absorb road shock. Flexible and water-resistant Snake Tape is best for manual or automatic sealing. You may advertise your trade mark or name in colors if you like.

For **FREE** 15 yard sample write: **ANGIER CORPORATION,** Framingham 1, Mass.



NOW APPROVED...
center seam sealing with reinforced Snake Tape is approved for rail shipment under Rule 41, U.F.C.



To demonstrate the comparative deposit-forming tendencies of compressor oils, two drops of a typical compressor oil were heated until evaporated. Notice the large deposit, *most of which is carbon*, left by the typical compressor oil. A new Solnus oil, after the same evaporation test, leaves a much smaller deposit.

NEW SOLNUS OILS HELP KEEP COMPRESSORS CARBON-FREE

THREE MINUTE TEST right at your desk shows why Solnus oils are the best for your compressors.

The chief enemy of air compressors is carbon build-up. The best way to avoid this hazard is to use the compressor oil that has the lowest carbon-forming tendency.

Sun's new Solnus oils have been proved to be ideal compressor lubricants. The minute amounts of carbon that form are fluffy and blow away easily . . . assurance against dangerous build-up of carbon on valves and exhaust ports. Tear-downs for cleaning are kept to a minimum.

We'd like to show you, right on your desk top, the dramatic test pictured above. Ask your Sun representative about it the next time he calls or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. SI.

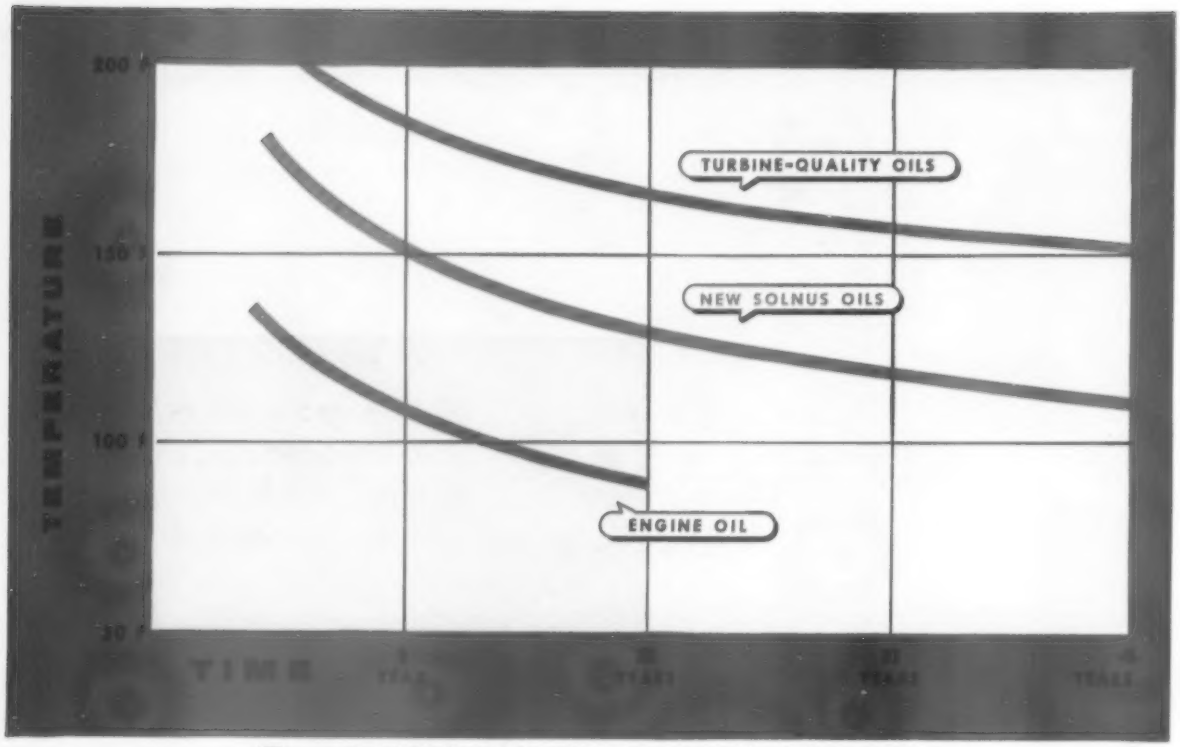
Please turn to the next page

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



This graph is based on 10% make-up per year and a 40-hour week.
The yellow area represents approximately 80% of all applications.

NEW SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

High grade lubricants for squirt-can prices . . . New Solnus oils give more lubrication per dollar

The lubricated parts of most machines—our estimate is 80%—operate at temperatures below 130 F and the time between oil changes is less than 2 years. New Solnus oils were specifically developed to meet these operating conditions at the lowest possible cost.

The above graph compares the service life of new Solnus oils with that of an expensive, turbine-quality oil, and an oil of the type old-timers call "engine oil". The service life of the turbine-quality oil is excellent and probably covers 99% of all applications . . . but for a premium price! The engine oil has a very limited life. It cannot be used safely, except for a very short time, at even moderately high operating temperatures, and it gives very little protection against rust and corrosion.

Now look at the service life of new Solnus oils. They easily meet the service requirements of at least 80% of all oil lubrication jobs and they sell for a squirt-can price! In addition, new Solnus oils are fortified to prevent both rust and oxidation . . . a feature usually found only in more expensive oils.

For the full story on new Solnus oils, see your Sun representative or write Sun Oil Company, Philadelphia 3, Pa., Dept. SI.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

85,000 Sling Users Liked the First Edition ... NOW

FREE!

New expanded edition of our Famous Tuffy Sling Handbook... Mail coupon for copy today!

Tuffy's really tough. Bend it, loop it, jerk it. Tuffy's 9-part machine braided construction resists kinking. But if you are able to kink it by hand, see how easy it is to straighten out without damage.

Tuffy's **pressed-on** and swaged end ferrule eliminates rough edges that snag or catch. Smoothed edges protect hands, speed loading. Tucked-in splice is covered by new pressed-on ferrule—has 100 per cent of rated strength of the sling itself!

If you're a plant engineer, safety engineer, purchasing agent—if you use or buy slings—you need this new, enlarged edition of the most popular sling handbook ever published!

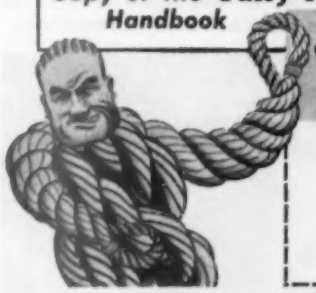
New types of factory fitted slings have been added to the Tuffy line. Now, old and new types are all made with a heavy walled steel ferrule. Ends of the ferrule are swaged flush with the machine braided strands leaving no projections to snag on loads. Many of the fittings—clamps, hooks, bridles, thimbles, saddles—are new, too. And this latest edition of the Tuffy Sling Handbook contains a host of other information you want and need for your job: a complete rigger's manual, authorized ratings and specifications for all Tuffy Slings; a new engineer's notebook; data tables on nearly a dozen versatile, easy-to-apply sling fittings.

But don't delay to order your FREE copy. Mail the coupon to us now. We'll send yours to you immediately.

CONSULT YOUR DISTRIBUTOR

when you want to buy Tuffy Slings or Tuffy Hoist lines to team up with your Tuffy Slings. Give him your requirements. He'll stock an inventory for you to draw against.

Mail Coupon For Your Free Copy of the Tuffy Sling Handbook



union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

2234 Manchester Avenue, Kansas City 26, Missouri

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COMPANY NAME_____

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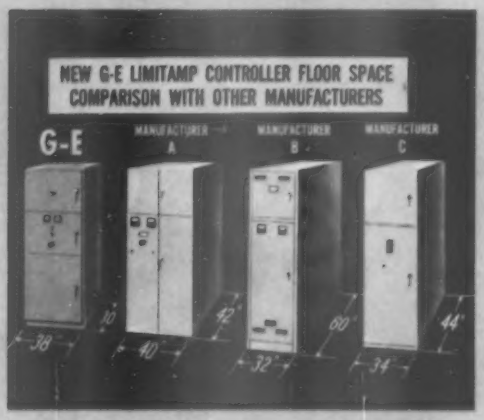


356 SQ. IN. LESS area than next smallest starter.

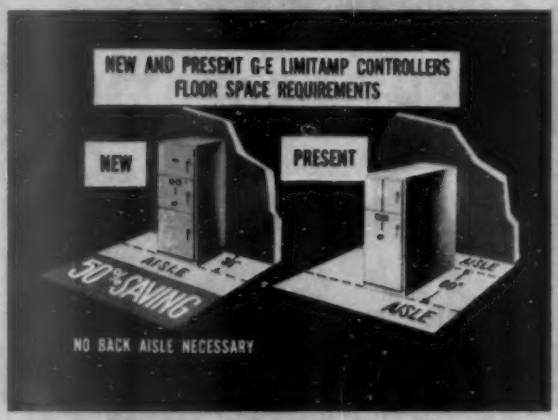
General Electric Announces . . .

NEW Limitamp*

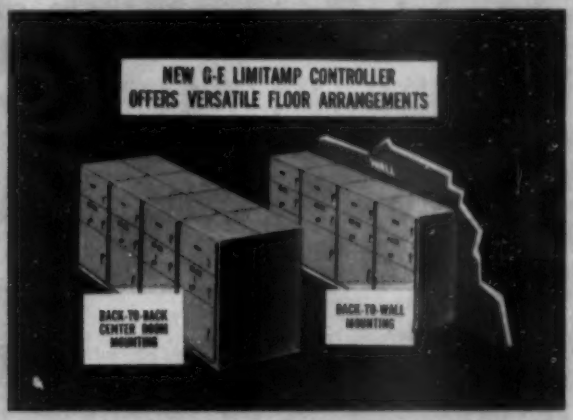
- **Gang-operated disconnect switch on all units**
- **Entirely front connected**
- **30-inch depth**
- **Low-voltage panel hinged to swing out of enclosure**
- **Contactor rolls in or out of cabinet**

NEW DESIGN

INSTALLATION IS SIMPLIFIED. A man can easily enter enclosure to make connections.



OVER 50% SPACE SAVINGS by elimination of back-aisle.



VERSATILE INSTALLATION—units all front connected.

Control saves over 50% floor space

ENTIRELY FRONT CONNECTED, only 30 inches deep, General Electric's all-new Limitamp control offers versatility of installation. New 30-inch depth allows unit to be transported through normal size doorways, and 90-inch height includes bus compartment. Back-to-back, back-to-wall, or mounting as free standing enclosure is now possible.

IDEAL FOR HIGH-VOLTAGE MOTORS, rated 2300-4800 volts and up to 3000 h-p, the new Limitamp control may be applied to squirrel-cage, synchronous, wound-rotor, and multi-speed motors on power systems requiring high interrupting capacity for maximum short-circuit protection.

NEW CONCEPTS IN SAFETY are built into new Limitamp control. Gang-operated disconnect switch, steel barriers between all compartments, enclosed bus compartment and co-ordination of starter assure you of safer high-voltage motor control.

G.E. LIMITAMP STARTERS are co-ordinated to provide maximum protection for equipment and personnel. Co-ordinated circuit components guard against needless fuse blowing, give running overload protection and provide maximum safe-guard against short-circuit damage for starter and equipment.

FOR COMPLETE APPLICATION ENGINEERING service contact your nearest G-E Apparatus Sales office. Write for Bulletin GEA-6331, Section 781-12, General Electric Co., Schenectady 5, New York.

*Trade-mark of General Electric Company

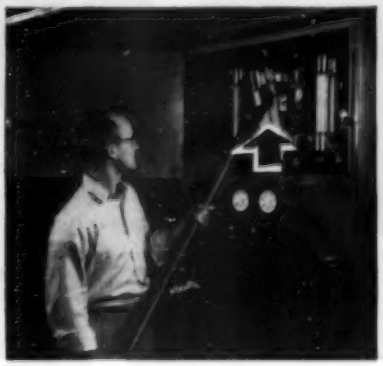
Progress Is Our Most Important Product

GENERAL ELECTRIC

SIMPLIFIES INSTALLATION AND MAINTENANCE

MAINTENANCE IS EASY. Low-voltage panel swings out, contactor rolls out.

TYPE EJ-2 CURRENT-LIMITING fuses are safely, quickly replaced within seconds.



SAFE VISUAL CHECK of disconnect switch with fuse compartment door open.

Is there such a thing as...

A PRACTICAL REPLACEMENT PROGRAM?

YES! — and Jones & Lamson can help you develop it

Industry unanimously endorses the idea of planned replacement of capital equipment. Nevertheless, most of America's machine tools are more than 10 years old, sadly inferior to today's profit-producing equipment. The idea is sound — but action is lacking.

Biggest reason for this paradox is financial. Until recently, replacement required a substantial outlay of capital. In many cases, needed capital was lacking; in others, the capital, though available, had many other calls upon it. Unrealistically low depreciation allowances on capital equipment served as an added deterrent to replacement.

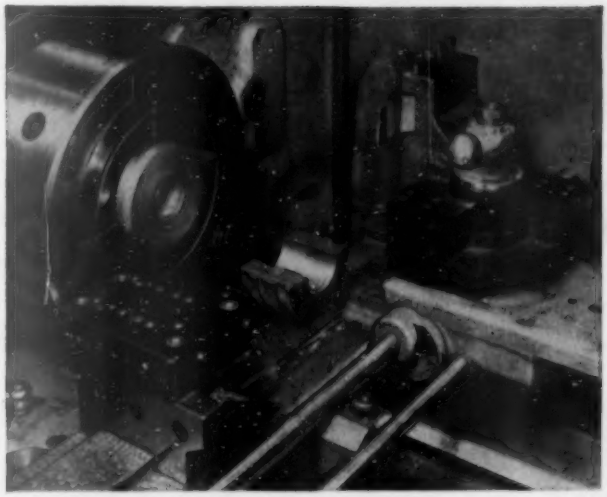
The picture has changed. Now, provisions of our new tax laws permit more equitable write-offs, and make replacement a more attractive proposition.

Jones & Lamson makes replacement even *more* feasible, by clearing away the traditional difficulties of financing with its unique Procurement Plans.

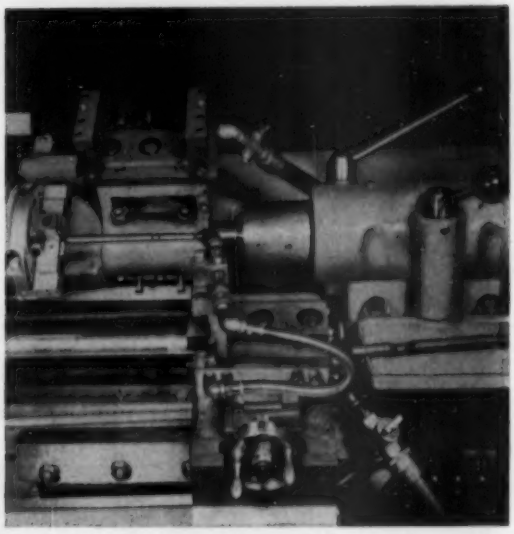
This, then, is what Jones & Lamson offers: modern machine tools that can greatly improve your production; *plus* your choice of several sound, low-cost (interest rates of 3¼%, and lower, add-on) methods of procuring these tools.

◀ **OBSOLETE** machine tools like these hamper industrial growth, keep production low, and costs high.

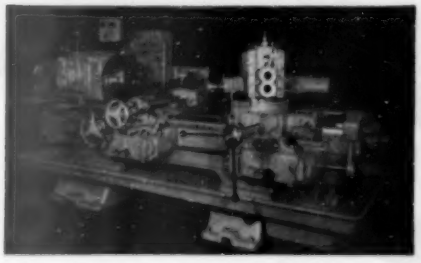
RESEARCH in machining methods, metallurgy, tool geometry, is carried on continually by J & L. Important findings have resulted in the incorporation of unique engineering features in J & L machines.



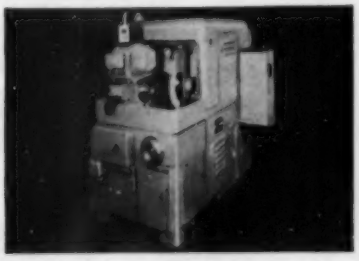
IMPROVED production on this difficult machining job was made possible by J & L engineers' close co-operation with the customer. Research testing, and incorporation of special features on a J & L turret lathe cut time-per-piece on this bottle neck-ring from 14 to 5¼ min., increased production 120%!



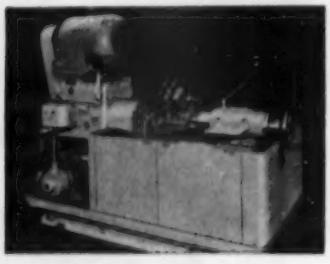
AUTOMATIC OPERATION. One Fay Automatic Lathe replaced eight engine lathes formerly used on this job — and substantially increased production of sewing machine crankshafts at the same time.



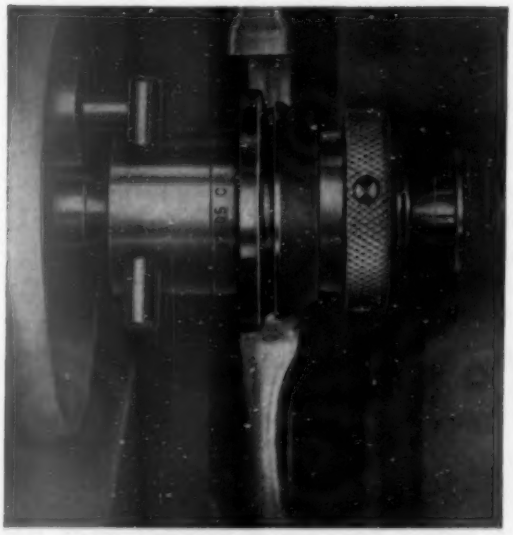
Universal Turret Lathes



Automatic Thread & Form Grinders



Fay Automatic Lathes



GRINDING. This J & L Model "E" Form Grinder, used in producing seaming rolls for the canning industry, completely eliminated a roughing operation, increased production by 100%.

JONES & LAMSON

MACHINE J&L COMPANY

505 Clinton St., Springfield, Vt., U. S. A.

Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread & Form Grinders
Optical Comparators • Automatic Opening Threading Dies & Chasers
Automatic Double-End Milling & Centering Machines

Send today for complete details on J & L's machines, methods and Procurement Plans. Simply fill in the coupon below, clip it to your letterhead *and mail. We'll do the rest.*

JONES & LAMSON MACHINE COMPANY
505 Clinton St., Springfield, Vt., U. S. A.

GENTLEMEN:

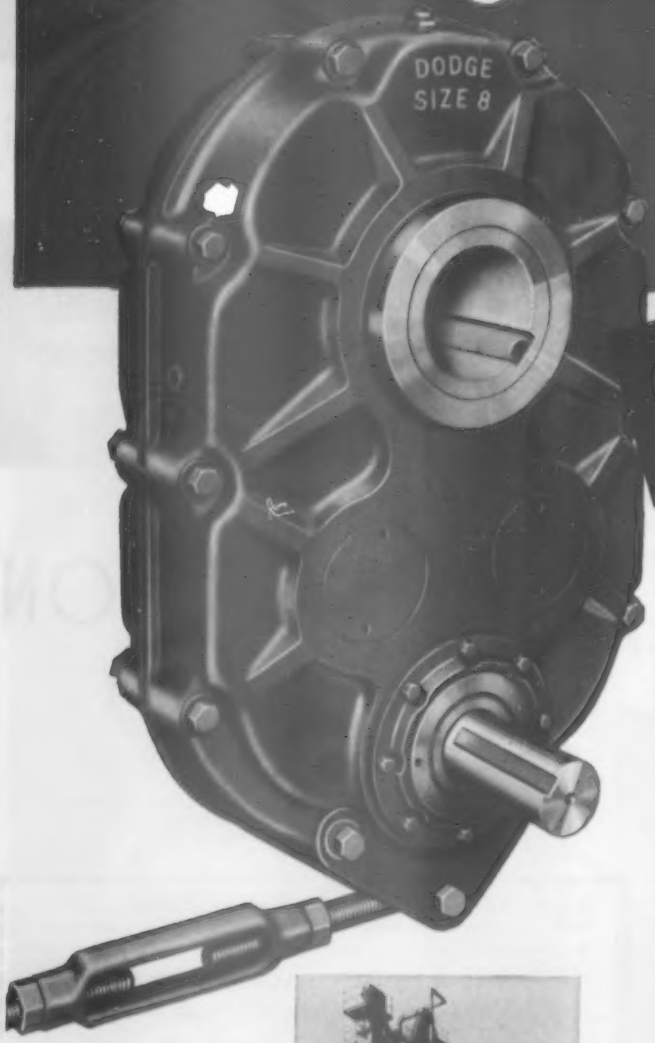
Please send me the J & L Machine Tool Replacement Information Kit.

Name.....

Title.....

DODGE Torque-Arm

America's most complete



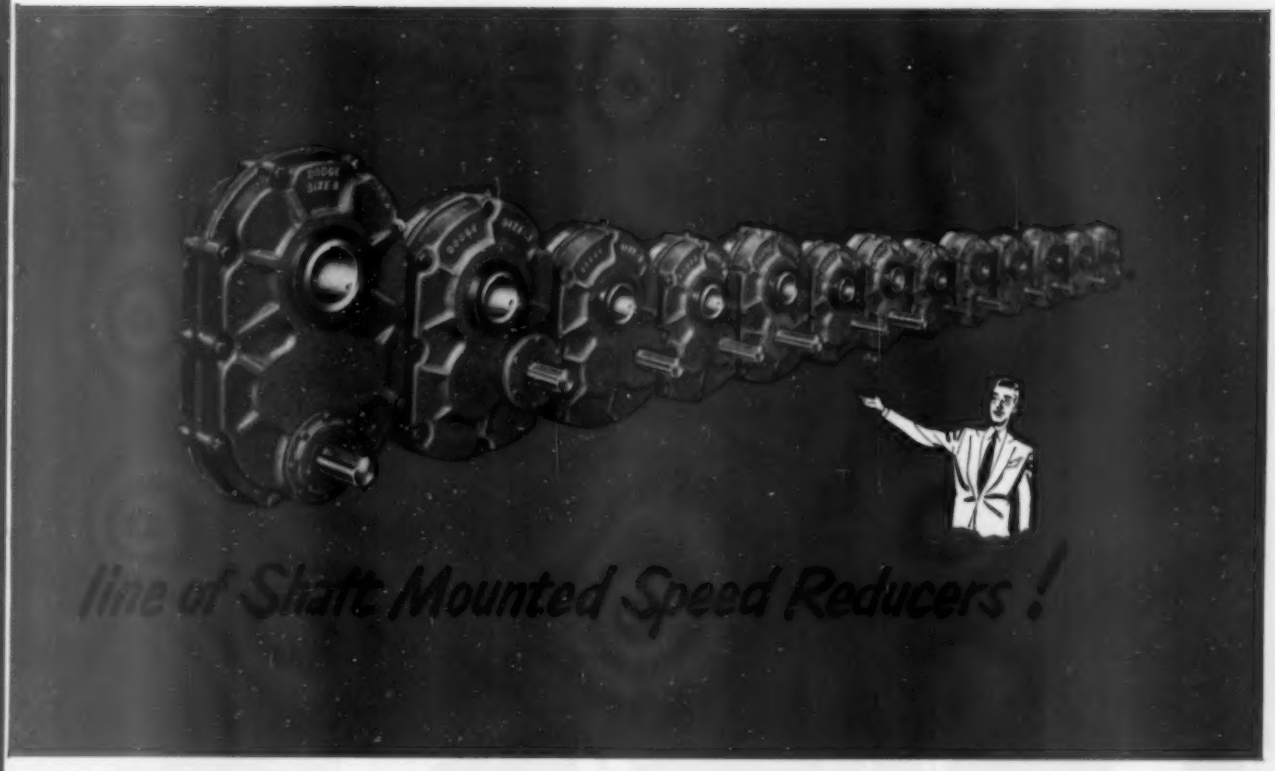
NOW-

SAVINGS EXTENDED TO YOUR BIG JOBS WITH THIS NEW 60 H.P. SHAFT-MOUNTED SPEED REDUCER!

All the advantages of shaft-mounting . . . all the proven performance and economy features of Dodge Torque-Arm Speed Reducers . . . are now available for your *big* jobs. The husky new size No. 8, in the double reduction series, has a capacity of 60 hp at 100 rpm, AGMA rating, and can be mounted on shafts up to 5-inch diameter.

The performance record of Torque-Arm Speed Reducers, as demonstrated in tens of thousands of installations, shows efficiency up to 97%, and substantial savings in costs. These advantages will be even more significant in the big installations for which this newest addition to the line is provided.

Torque-Arm Speed Reducers driving the trunnions rotating an asphalt kiln.



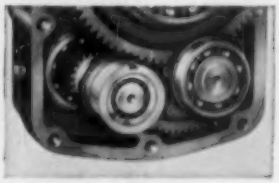
The new No. 8 has all the inherent advantages of the Dodge Torque-Arm line. No foundation, no flexible couplings, no sliding base required—and there are no lining up difficulties. It is mounted directly on the shaft. The torque-arm, fastened to any fixed object, anchors the reducer. The unit is driven through V-belt drive. Dodge Taper-Lock Sheaves, available from stock, permit any speed ratio desired.

Another new member of the Torque-Arm line is the single reduction No. 11 (1.3 hp at 100 rpm, AGMA rating). Torque-Arm Reducers are now supplied, in both single and double reduction series, with capacities from 1 to 60 hp, output speeds from 12 to 365 rpm. All sizes are available with built-in backstop as well as the Tri-Matic Overload Release which is designed especially for the Torque-Arm Speed Reducer.

For detailed information and recommendations for applications to your needs, call the Transmissioneer, your local Dodge Distributor. Or write for Bulletin.

DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana

Tri-Matic Overload Release, optional, loosens the belts, cuts off power, gives a warning in case of an excessive load.



Built-in backstop is available when conditions require a device to prevent the reversal of direction of rotation.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE

of Mishawaka, Ind.

$1,542,263 worth

A BOOKKEEPING

AMERICAN MUTUAL

© 1955, AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

# of black ink

STORY by Mr. Friendly

Or how 15 companies insured with American Mutual saved 49.2% of their total premiums over 6 years!

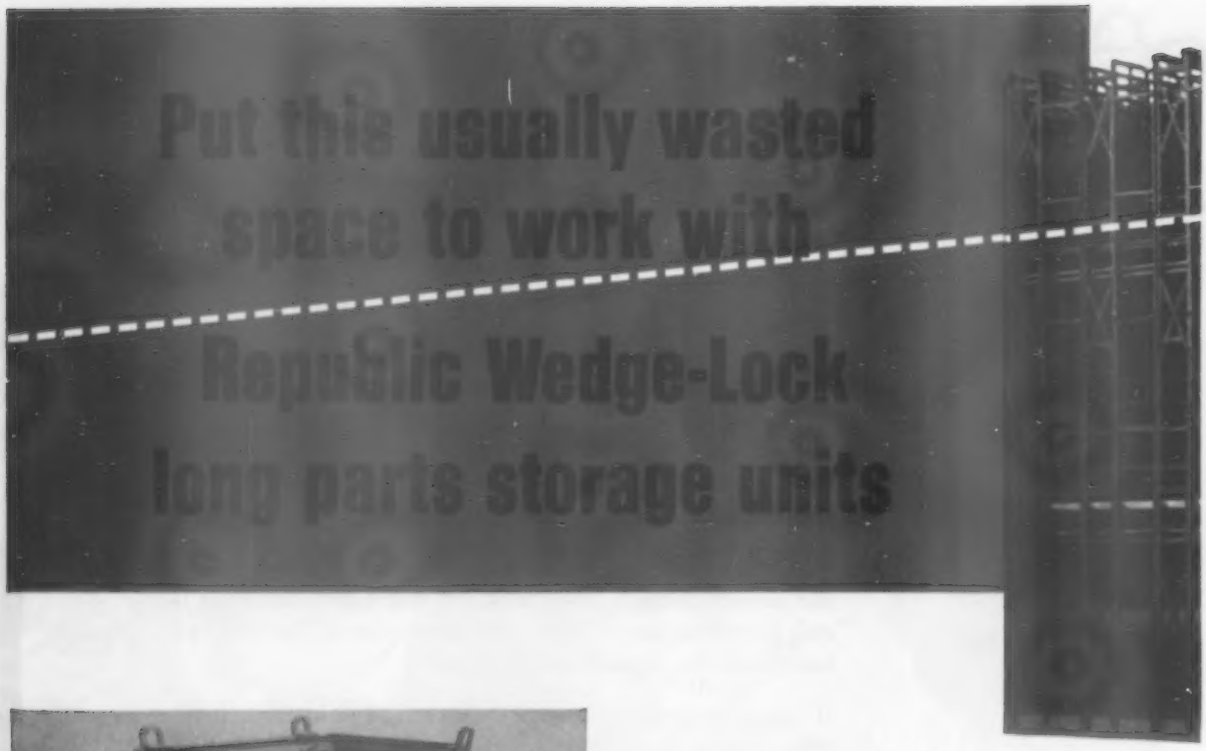
This is certainly one for the books—proof in black ink and white paper that American Mutual's safety engineering service for its policy holder companies pays off in impressive figures.

But savings through lower premiums and higher dividends is only part of the story. There's also prevention of disability and loss of life that figures alone can't tell.

If you're interested in a service that combines humanity, efficiency and economy, send for further information about these 15 case histories. Write: American Mutual Liability Insurance Company, Dept. F-128, 142 Berkeley St., Boston 16, Mass.

COMPANY	PRODUCT	TOTAL SAVINGS ON INSURANCE
Houghton Mifflin Co.	Publishing	$ 37,906
Heintz Manufacturing Co.	Metal Products	303,949
Continental Mills	Textiles	49,146
Dodge Manufacturing Corp.	Metal Products	82,954
Acushnet Process Co.	Golf Balls & Rubber Products	199,301
The Bristol Brass Corp.	Brass Sheets, Wire	72,002
Sealed Power Corp.	Piston Rings, Pistons and Cylinder Sleeves	156,000
Utica Drop Forge & Tool Corp.	Tools & Jet Parts	212,734
Alice Manufacturing Co.	Textiles	63,555
Fayette R. Plumb, Inc.	Tools	26,950
Avondale Mills	Textiles	107,113
W. C. Hamilton & Sons	Paper	73,640
Yates-American Machine Co.	Machinery, Motors, Metal Products	100,102
Allen-Rogers Corp.	Woodworking	25,025
Freiberg Mahogany Co.	Lumber	31,886
		$1,542,263
Average % of premium saved in last 6 years for all companies		49.2%

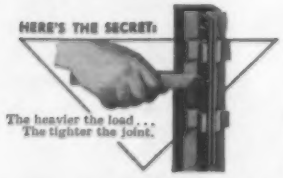
Service from 77 fully staffed offices!
Savings from regular substantial dividends!



REPUBLIC MATERIALS HANDLING EQUIPMENT is built to meet the requirements of each individual job. Steel boxes, skids and pallets speed production, save floor space, require minimum maintenance, help produce savings. Pictured is the PB-120-CT Box and Skid Unit for use with lift truck. Also fitted with combination tiering and lifting lugs for easy crane handling. Contact your local Republic materials-handling dealer or send coupon for more information.

YOU GET BOTH BEAUTY AND EFFICIENCY when you outfit your office with handsome equipment made by Republic's Berger Division. Smartly styled steel desks feature new eye-comfort tops to reduce eye fatigue. Rigid construction and nylon glides assure smooth non-sticking operation of drawers. Berger's modern Steel Vertical Files, built for a lifetime of service, are striking companion pieces. Send coupon for complete information on the big Berger line.

Exclusive construction permits high stacking of tremendous loads

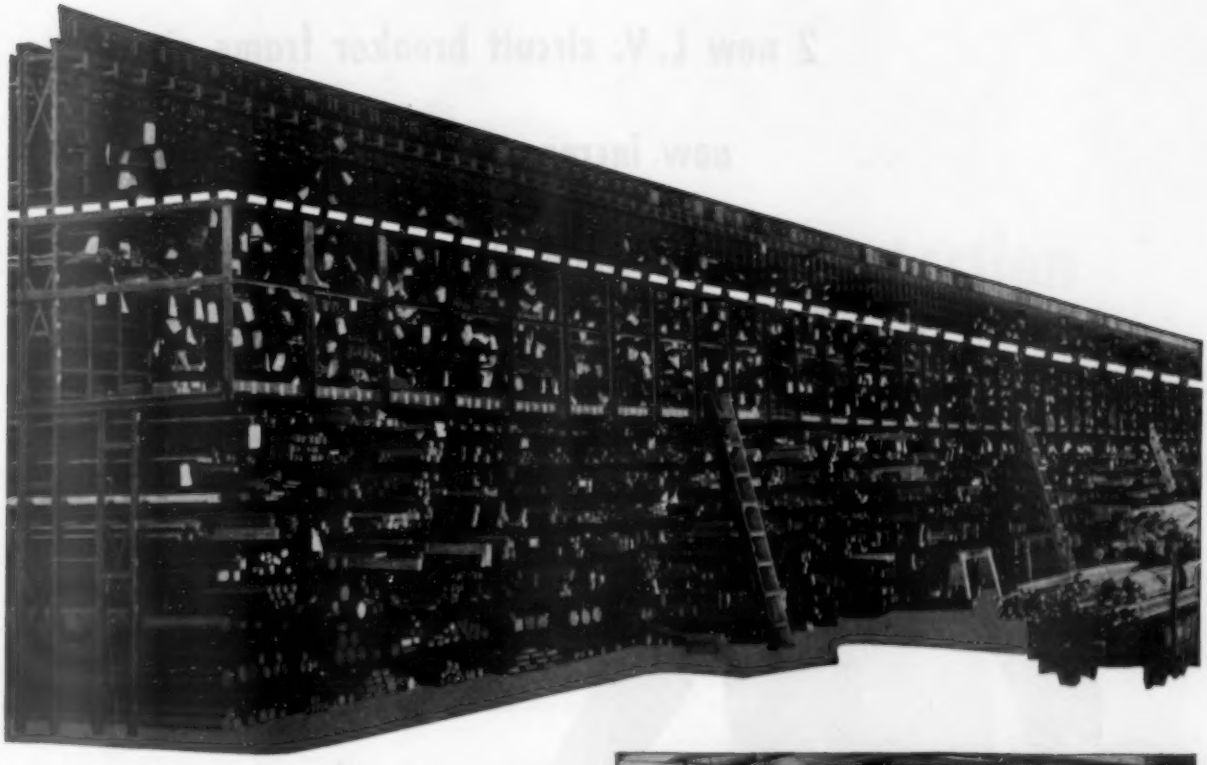


Overhead storage space may be going to waste in your present system. Particularly, where heavy or bulky items are stored.

Wedge-Lock Long Parts Storage Units are specifically designed for high stacking of enormous weights—with no sagging, swaying, or buckling. The reason is the exclusive joint design developed by Republic's Berger Division. As weight increases, joints actually get tighter, increasing the stability and rigidity of the entire assembly. Result: you get maximum loading in a minimum of floor area

REPUBLIC

World's Widest Range of Standard



—plus a more efficient use of overhead space.

Amazing Wedge-Lock increases the efficiency of your entire handling system by providing wide unobstructed aisles, easy access. It is completely flexible, can be assembled quickly and easily to accommodate your own specific storage requirements.

Specify Wedge-Lock for a smooth, fast flow of materials from receiving to shipping. A storage-engineering expert in your nearby Berger Division sales office is always available to help you determine your needs and plan an efficient installation. Call him soon or send coupon for literature and full information on the Wedge-Lock principle.

THE WORLD'S LEADER IN LOCKERS, Republic's Berger Division offers a wide selection of standard steel lockers for every industrial use. Modern design assures full-time protection for personal property. Handles are tamper-proof, cannot be removed. Continuous door strikes along sides prevent insertion of tools for prying. Berger offers a complete locker planning, engineering and installation service. Send coupon for more details.

REPUBLIC STEEL CORPORATION
3140 East 45th Street,
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REPUBLIC STEEL

Please send me complete literature on:

- ☐ Long Parts Storage Units
- ☐ Lockers
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R-7714

STEEL

Steels and Steel Products

2 new L. V. circuit breaker frame sizes . . .

new increased interrupting ratings . . .

new range of applications . . . . . .

With L. L. Fountain here are the two new Westinghouse DB breakers for low-voltage power distribution, with interrupting capacity up to 150,000 amperes.

blanket industry's circuit protection needs to 150,000 amperes

1. Two new Westinghouse DB breaker sizes—the DB-75 and DB-100—complete your low-voltage power distribution circuit protection requirements.

2. Interrupting ratings for all five breaker sizes have been increased on 240-volt and 480-volt, nonselective applications (table below).

This means you now get much greater short-circuit and overload protection in the same frame sizes . . . greater interrupting capacity in the same floor area.

3. All Westinghouse DB breakers now are equipped with the exclusive air-delayed overload tripping device with an unexcelled range of optional settings—standard instantaneous and long-time delay with *9 calibrated settings,* or selective tripping units with combinations of long and short-time delay with *13 settings.* This means, for one thing, that you get a greater variety of switchboard and switchgear application possibilities, to meet increasing power needs and changing production situations.

In addition to these new developments, the DB line of breakers incorporates such features as metal bases, individually insulated poles, fully insulated tripping adjustments and maximum accessibility to all components—features that add up to many years of trouble-free circuit protection.

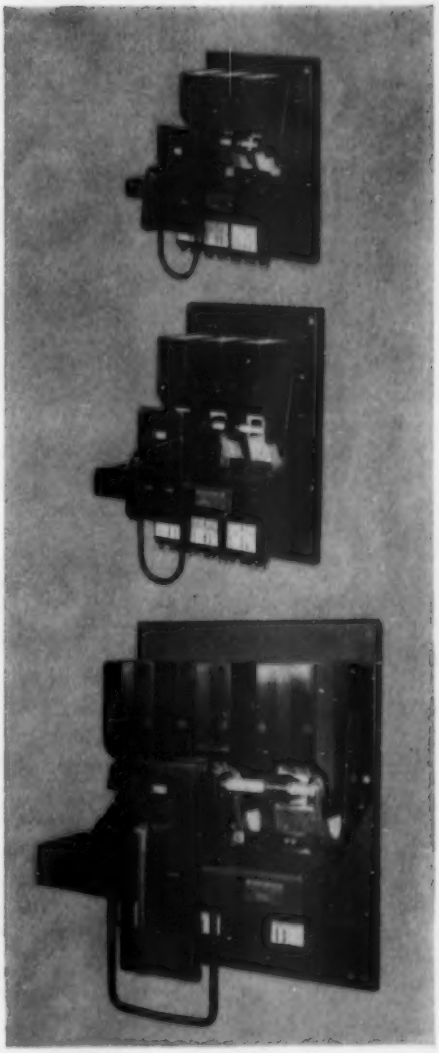
Contact your Westinghouse sales engineer for assistance in circuit breaker application, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60884

Nonselective Application Ratings for DB Breakers

Frame Size	Old Rating	New Rating	
		240 Volt	480 Volt
DB-15	15,000A	30,000A	25,000A
DB-25	25,000A	50,000A	35,000A
DB-50	50,000A	75,000A	60,000A
DB-75	75,000A	100,000A	75,000A
DB-100	100,000A	150,000A	100,000A

YOU CAN BE SURE...IF IT'S

Westinghouse



The DB-15, DB-25 and DB-50 circuit breakers, with their increased I. R. and comparable characteristics, cover the lower ranges of current ratings.

A
B
C
D
E
PROPER COOLANT FILTRATION CAN:
A Eliminate frequent throwaways, reducing amount of coolant used by as much as 50%.
B Cut number of wheel dressings in half, increasing wheel life.
C Completely eliminate hundreds of man-hours per annum on sump cleaning and sump pump maintenance.
D Boost efficiency of grinder, increasing machine output.
E Definitely raise quality of work, holding closer tolerances, with resultant savings through fewer rejects.
A filter's got to be good—and right to save money

PROPER FILTRATION

can save you thousands in maintenance and materials

For fuel, hydraulics, lube . . . any fluid – in thousands of applications in industry . . . filters that are properly selected and installed pay for themselves in a surprisingly short time. They render a substantial saving month after month from then on. You want facts, not adjectives? Take a look at the information on grinder coolant filtration in our illustration.

Naturally you'll insist on a quality filter. That goes without saying if you specify Purolator. But using the correct filter for your application can make a surprising difference in money saving results, too.

The Purolator line has been developed on a broader scale than any other filter line for just that reason. Purolator gives you a wider selection of standard units so your exact requirements can be met economically. And you get the valuable technical assistance of America's oldest and most experienced filter manufacturer to guide you in selecting the best unit for you.

This combination of engineering and manufacturing experience can add up to substantial savings. Send for Purolator's General Industrial Catalog, or better yet, ask us specific questions about possible filter applications in your plant. No obligation, of course. Address Dept. P1-105, Purolator Products, Inc., Rahway, N. J.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

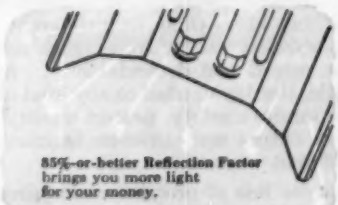
PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices; Chicago, Detroit, Los Angeles

More Upward Light reduces brightness contrast, increases seeing comfort, minimizes eye fatigue.

for greater Visual Comfort...

when all things are considered, the Better Lighting Choice is

New BENJAMIN DIFFUSERS



85%-or-better Reflection Factor brings you more light for your money.

All White Porcelain Enamel Reflectors support better visibility conditions, as well as encourage better housekeeping.

Better factory lighting today calls *for more upward light* as provided by the new Benjamin RLM Diffuser Reflector. By minimizing contrast between ceiling and the reflector, this unit improves visual comfort. Thus it contributes to lower cost, higher quality industrial production.

With the new Benjamin Diffuser Reflector you get this needed *upward light* at lowest over-all cost. You get a unit that meets the new, higher RLM standards for this type of upward light reflector. In addition, you get many exclusive Benjamin features, such as Springlox lampholders, Life-Time porcelain enamel, special hanger and coupling devices for individual or continuous line installation . . . all of which reduce the over-all lighting cost.

The new Benjamin pamphlet on "Better Factory Lighting" brings you helpful suggestions on lighting selection. Read it with profit for a further insight on why, when all things are considered, the Better Lighting Choice is Benjamin. For your free copy, write Benjamin Electric Mfg. Co., Dept. N, Des Plaines, Ill.

All these things considered...
- 1. Specific Units for Every Need
- 2. Precision Construction
- 3. Low Installation Cost
- 4. Minimum Maintenance Cost
- 5. Lowest Over-All Cost

make BENJAMIN the choice for better lighting!

B-1051

SOLD EXCLUSIVELY THROUGH ELECTRICAL DISTRIBUTORS

Power factor correction capacitors at Kansas City Power & Light are switched in when temperature changes . . . to compensate for air conditioning loads. Honeywell Industrial Thermostat on the utility pole does the job . . . at much lower cost than usual current control devices.

Honeywell Controller Cost $19.00*

Hosiery mill steam plant saves $1175 in fuel yearly by installing a pair of Honeywell Pressure Controllers, which make it easy and foolproof to switch from high pressures for peak production to low pressures for supplying night shift and weekend needs.

Honeywell Controller Cost $40.00*

Water consumption is reduced at Atwood Vacuum Machine Co., Rockford, Ill. A Honeywell *Aquastat* temperature controller and solenoid valve turns on a spray of tap water to reduce temperature of the coolant only when needed . . . with resultant decrease in water consumption.

Honeywell Controller Cost $12.50*

*Approx. cost. Prices subject to change without notice.

Honeywell Industrial Controls

Reduce costs

Don't overlook these simple, low-cost controllers...they're the ideal solution to hundreds of problems

Cutting costs for materials, fuel or utilities doesn't always call for elaborate automatic control equipment. In scores of spots around your plant, you can effect substantial savings by putting simple, inexpensive Honeywell Industrial Controls on the job.

By regulating temperature, pressure, vacuum, liquid level or humidity, these versatile controls can help you avoid waste . . . reduce rejects . . . save manpower . . . prevent down-time. More than 7000 different models give you an unequalled variety from which to choose. They're simple, rugged and dependable . . . and cost surprisingly little. Readily applied to any kind of equipment, they can improve safety, protect quality of production, increase output and minimize maintenance in hundreds of different ways.

This comprehensive line of precision-made products is backed by the extensive application experience and world-wide service facilities of the largest manufacturer of controls. For a discussion of how they can be applied in your own plant, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

Also manufacturers of a complete line of precision measuring, recording and controlling instruments.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

WHAT IS A WICKWIRE ROPE DISTRIBUTOR?

- He's quality people...handling quality products.
- He knows the local industries he serves, and he knows wire rope.
- He solves your wire rope problems. His own first-hand knowledge and experience are backed up by the technical assistance of Wickwire Sales Engineers.
- He brings you Wickwire Rope and Slings at the lowest possible cost, because he spreads his sales and distribution expense over the hundreds of related items he carries.
- He stocks exactly what you need, saving you time, paper work and storage space.
- He's a good man to know. Buy your Wickwire Rope and Slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

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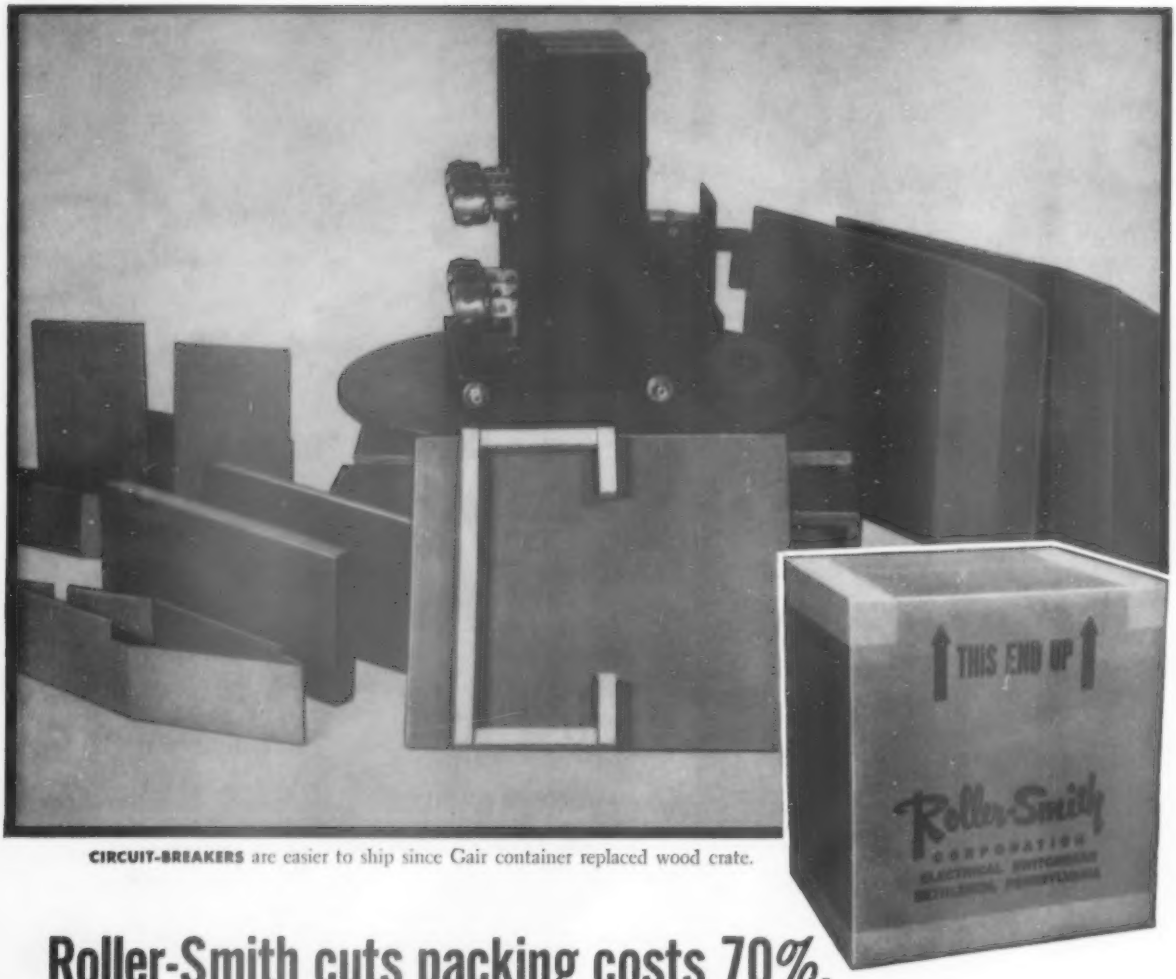

CIRCUIT-BREAKERS are easier to ship since Gair container replaced wood crate.

Roller-Smith cuts packing costs 70%, shipping weight 27½% with new Gair Container

These percentages are based on actual time studies run by Roller-Smith Corporation, Bethlehem, Pa., on the packing of their heavy circuit breaker.

Cutting lumber, assembling a wooden crate and packing used to take 57 minutes. With the new Gair container the job takes only 17 minutes — a 70% reduction. Material costs also dropped 9¾%, and net shipping weight of the container plummeted 27½%.

What's more, the Gair container has chalked up an excellent record for protection in transit, as well as guarding against loss of accessories often included in shipments. Extra dividends include:

- *advertising* value of Gair's printing
- *dust protection* of Gair's sealed construction
- *elimination of safety hazards* in handling wood
- *reduction* of required storage space

Maybe there's some way Gair could improve your product's shipping container. How about calling your nearest Gair container plant and finding out?

YOU'RE LIVING NEXT DOOR TO THE EXPERT

GAIR CONTAINER PLANTS: Atlanta, Ga. • Cambridge, Mass. • Cleveland, Ohio • Holyoke, Mass. • Jackson, Miss. • Los Angeles, Cal. • Martinsville, Va. • New Orleans, La. • No. Tonawanda, N.Y. • Philadelphia, Pa. • Plymouth, Mich. • Portland, Conn. • Richmond, Va. • Syracuse, N.Y. • Teterboro, N.J.

SINCE 1864 GAIR®

GAIR

SHIPPING CONTAINERS • FOLDING CARTONS

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SC5-8

AIRengineering at work
REPORT No. 4150.25

Cuts 60 Second Metal Drilling Job to 15 Seconds . . . with Air Punching Tool

A sub-contractor for a large auto manufacturer formerly used two men, an electric drill and a drilling jig to drill two ¼" holes in rear auto fenders.

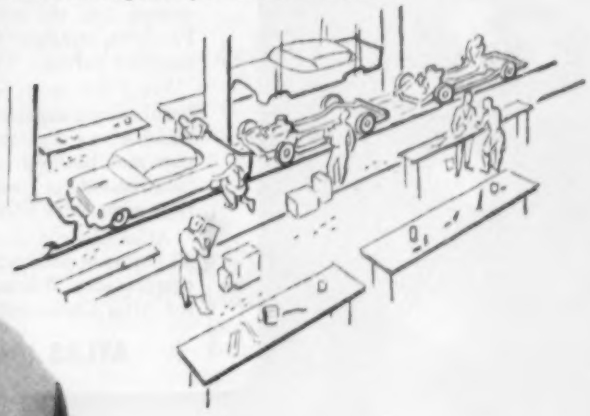
This method required a whole minute and failed to provide uniform results. In addition, paint damage and broken drills caused excess time loss.

AIRengineering by Ingersoll-Rand solved the problem fast. A size AR130 Air Buck Riveter was equipped with special yoke, punches and stripping mechanisms. The holes are now punched four times faster, with closer tolerances and only *one* man is required instead of two.

If you are in a position to encourage cost-savings in your plant, you should see I-R's confidential manual reports on "AIRengineering at Work". Write on your company letterhead and we'll arrange for you to see it soon.

AIRengineering Manual
Over 100 interesting and helpful case history applications of AIRengineering at work.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.



Air Buck Riveter
Punching two ¼" holes in rear auto fender.

8-257

"FINEST CHAIN *for* TOUGHEST DRIVES"

WAYNE-INVADER PUMPS RELY ON ATLAS

...for long life under hard service

Invader Rotary Pumps are workhorses for all industries. That's why the Schirmer Division of the Wayne Pump Company equips all chain-drive pumps, like the oil refining unit above, with Atlas Roller Chain and Precision-Matched Sprockets. They say Atlas is the finest chain for the toughest drives.

Long life starts with Atlas specially selected steels. Plates, pins, and bushings are super-toughened by heat-treating and the "Ni-Carb" process which give a stronger, better operating chain over longer periods. Rollers, pins and bushings are "Micro-Finished" to exact tolerances. Sprockets heat treated for toughness are precision-ground for smooth, quiet operation with Atlas Chain.

Atlas Chain and Atlas Sprockets are carefully pre-tested at more than 30 points in production to assure you of chain unsurpassed in quality and performance. Whatever your chain or sprocket need call on Atlas. Write for Atlas Chain and Sprocket Handbook ARC-54.

ATLAS CHAIN & MANUFACTURING COMPANY
DOYLESTOWN, PA.

ATLAS

ROLLER CHAIN AND SPROCKETS

What is your Control Need?

. . . a starter for a fractional hp motor?

This small inexpensive control provides thermal overload protection. . . . Compact construction permits mounting where space is at a premium. Designed for use on ac single-phase power systems . . . up to 230 volts.

. . . a controller for a 2300 to 5000-volt motor?

Here is a control for motors up to 2500 horsepower. All components — contactors, meters, overload relays, auxiliary switches — are selected to meet the particular requirements of your application. Current-limiting fuses give split cycle short circuit protection.

. . . or other applications?

Specific applications, including those between the above-mentioned limits, are made from an extensive line of starters and control components. These standard units are factory assembled in infinite combinations to meet practically any requirement. For help on a particular application, call your Allis-Chalmers representative. His recommendations are backed by Allis-Chalmers engineering departments . . . by experience gained solving thousands of control problems . . . by complete research and testing facilities.

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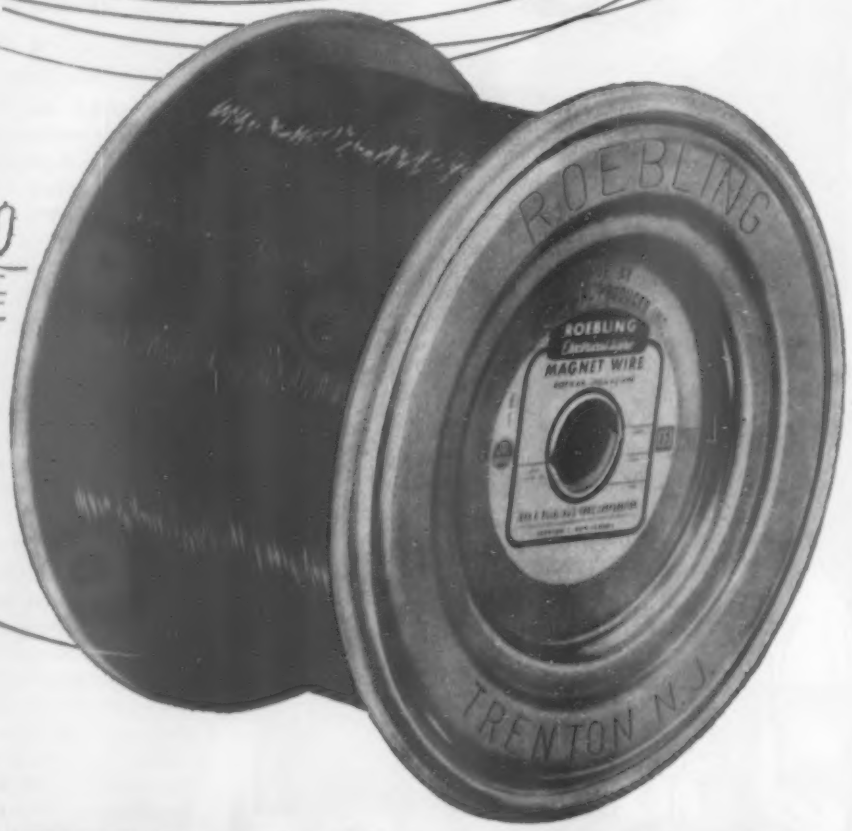
YOU WANT

- TOUGHEST INSULATION—FOR HIGH SPEED WINDING;
- TOP ABILITY OF INSULATION TO WITHSTAND BENDING WITHOUT CRACKING OR LOOSENING FROM THE CONDUCTOR;
- MAXIMUM RESISTANCE TO SOLVENTS IN TREATING VARNISHES AND TO ALL USUAL BAKING TEMPERATURES;

IN SHORT...

YOU WANT



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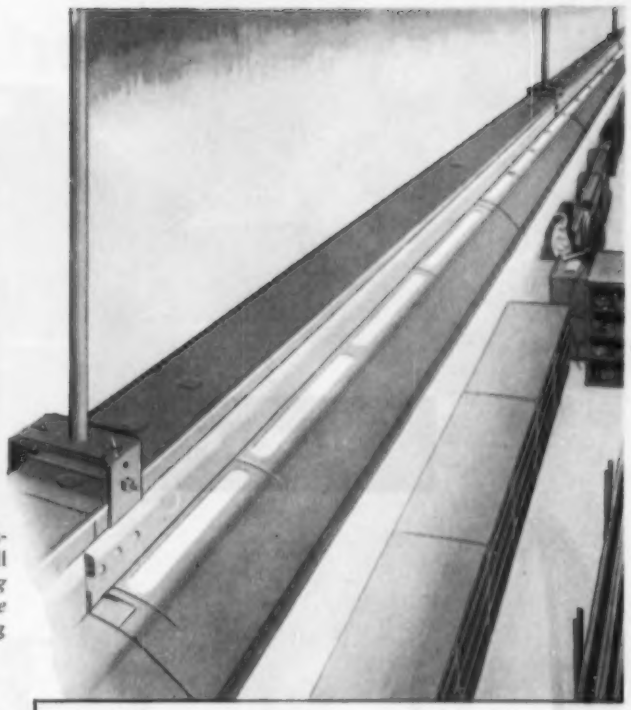
Why the Sylvania
DIAMOND-I
LIGHTING FIXTURE
is a plant engineer's best friend

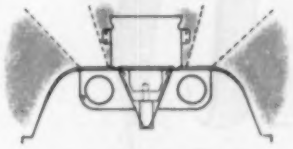


Better Plant Illumination

Sylvania's exciting new semi-direct fixture is taking industry by storm! Enlarged reflector slots release a full 25% of its light upward. *Result: More light on the ceiling . . . reduced contrasts overhead . . . less shadow and glare on work surfaces below!* Optimum 30° crosswise shielding protects eyes from direct glare of lamps.

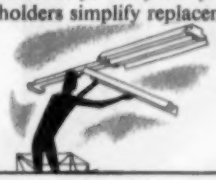
Maximum Lighting Efficiency

By unleashing more light upward which would normally be "trapped" between lamp and reflector, the *Diamond-I delivers an extremely high 89% lighting efficiency!* More light on the job means better seeing and working conditions, better morale, better quality and rates of production.



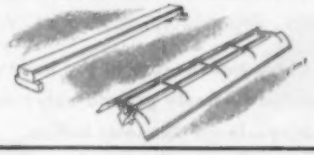
One-Man Maintenance

With 4-foot reflector-shields on both 4- and 8-foot units, one man can do it all alone! Reflector-shield is lightweight, easy to handle . . . secured to channel assembly using 2 captive bolts which can't drop out. Slots in reflector induce upward heat draft which helps carry away dust particles. Multi-socket lampholders simplify replacement.



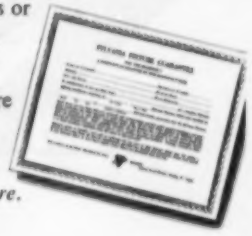
Quick and Easy to Install

Simply install the one-piece channel assembly, then fasten on the reflector-shield unit by its 2 captive bolts. Sufficient knockouts and slots in the channel assembly will accommodate all basic installation methods. Full-length grooves enable you to use slide-grip hangers.



2-year Guarantee—RLM approval

The Sylvania Diamond-I meets or exceeds all new RLM specs! Here's the industrial fixture of tomorrow, ready to be put to work for you *now*. What's more *—a replacement guarantee protects you against defective materials and workmanship for 2 years from date of manufacture.*



Send the coupon for complete specification information. ▶

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☐ Please send your complete data folder F-692 on the "Diamond-I."

☐ Have a Sylvania lighting specialist call on me.

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Organization_____

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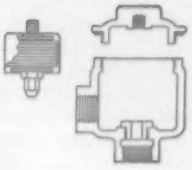
Quality

Just 3 quality parts—thermostatic bellows, body, cap. Simple, positive action. Won't leak!



Nicholson quality . . . that gives you the extra strength, extra capacity, extra *stamina* required for severest plant service. Nicholson quality pays off, when it comes to discharging condensate and air from steam lines . . . most efficiently, dependably, economically.

- **Powerful valve action—big husky bellows.**
- **Positive shut-off—finely ground valve and seat.**
- **High capacity—large diameter orifice.**
- **Rigidly tested—on actual steam lines.**

When less than best won't do, specify Nicholson. Send for *Catalog 953*.

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W. H. NICHOLSON and Company

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PERMACEL 30 HEAVY DUTY PLASTIC TAPE

insulating or identifying

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PERMACEL® TAPES

In our complete line, there's a self-sticking tape for every job . . . write Permacel Tape Corporation, New Brunswick, N. J.

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It's too good to keep!

"...you get quick cooperation at Lamson & Sessions"

Yes sir, it's true . . . the cooperation you get when you work along with Lamson & Sessions is worth talking about.

Many people, with fastener problems, have found that "Service" and "Cooperation" are more than just words at Lamson.

When you bring a problem to Lamson & Sessions involving critical delivery dates, unique specifications, or fastener budget limitations, the folks at Lamson pitch in enthusiastically to solve the problem.

This "something extra" is the reason so many of our customers have said that they *enjoy* doing business with Lamson & Sessions. This same cooperation and attentive service is the difference between just-another-bolt-factory and the *world's leading* fastener manufacturer . . . Lamson & Sessions.

You, too can enjoy this difference.

Lamson & Sessions

YOU GET MORE WHEN YOU BUY FROM . . .

The LAMSON & SESSIONS Co.

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Fact:

Westinghouse Air Handling Provides Effective Control of Airborne Hazards

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Cabinet-type electronic air cleaner—only 38" in direction of air flow—removes 90% of all dirt, dust, smoke, oil coolant mist—even germs—from atmospheric air.

▲ **VENTILATING SETS**

Compact, direct-connected, or belt driven for indoor or outdoor installation . . . for fume exhaust, ventilating toilets, stockrooms, locker rooms, and cafeteria kitchens. Readily available!

◀ **INDUSTRIAL FANS**

Rugged, efficient fans available on short delivery. Exhaust foul air, smoke, gases, fumes, metal dust, chips, shavings—even long, stringy materials. Three types of wheels.

Where health, safety and comfort require putting air to work properly, Westinghouse offers you a complete line of air moving and air cleaning equipment.

Compact and efficient, all Westinghouse units are designed to give long, trouble-free service. And you have the assurance that all parts are made by one manufacturer—one warranty—an exclusive Westinghouse-Sturtevant feature.

MORE FACTS . . . ? Call your nearest Westinghouse-Sturtevant Sales Engineer, he's the "Man with the Facts". . . or fill in the handy coupon below.

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YOU CAN BE SURE...IF IT'S Westinghouse

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Hyde Park, Boston 36, Mass.
Please send more facts on Westinghouse Air Handling Equipment.

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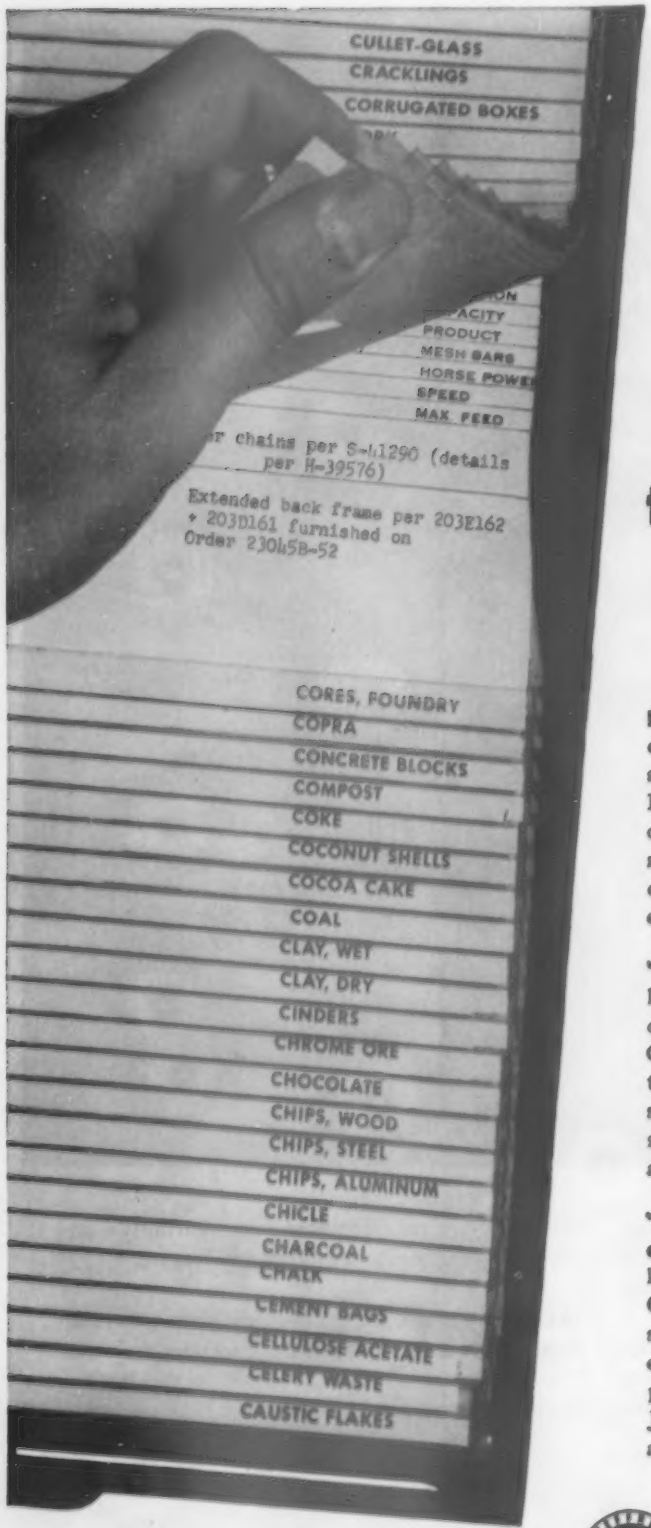
CITY ..... STATE .....



"what type of Crusher, Pulverizer, Shredder or Grinder do we need?"

you'll find the answers here in Jeffrey's files

During the past 60 years, Jeffrey reduction equipment has handled almost every conceivable substance, including many you'd never imagine. Our Reduction Engineers have in their files the history of all tests run on these materials, plus performance records on the machines sold for their reduction. You can check with Jeffrey and make sure of reduction equipment performance *before* you sign the order.

"But my product's new." Jeffrey's modern testing laboratory is completely equipped to determine the correct type and size of machine for a given task. Only a small amount of material is required for testing. You may witness the experiments, and results are held in strict confidence. All tests using standard equipment are made without charge to a customer.

"What machine will give us maximum efficiency and economy of operation?" The long, complete line of Jeffrey Crushers, Pulverizers, Shredders and Grinders enables us to give you the machine best suited to your specific needs. In most cases, standard equipment is recommended, with special internal parts where they are necessary. You can count on Jeffrey engineers to give you reliable and unbiased advice on crushing problems.

There is no substitute for know-how. *An outline of your reduction problems is all we need to submit recommendations. Write The Jeffrey Manufacturing Company, Columbus 16, Ohio.*

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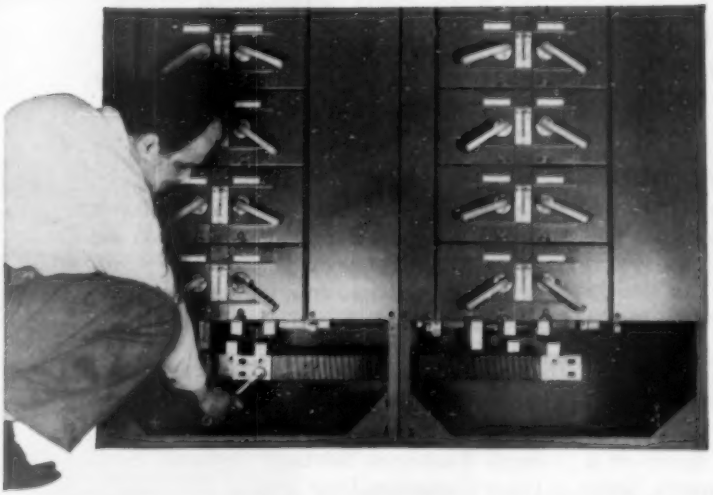
ADD CAPACITY WHENEVER YOU NEED IT! So simple. Just attach another section. And be assured you're using the best. The Unit-Versal Switchboard is the only one you can get with famous Vacu-Break switch units to smother arcs, decrease maintenance.

BULLDOG UNIT-VERSAL VACU-BREAK SWITCHBOARD Tailors Itself

to today's and tomorrow's power requirements



INSTALLS, EXTENDS, CONVERTS WITH ONLY A WRENCH AND A SCREWDRIVER!

What is adequate today may be inadequate tomorrow. But this need not be true in switchboards. For BullDog—pioneer in electrical distribution—has developed and perfected the Unit-Versal Vacu-Break® Switchboard.

It is the one, low-cost unit of its kind that permits you to *add, remove or change* switches and breakers simply and easily. Or double, triple, or quadruple the branch-circuit capacity of the switchboard itself by just attaching standardized sections. Also, its design is so simple, you can install, extend or convert it swiftly with only a wrench and a screwdriver.

Look into BullDog's safe, efficient Unit-Versal Switchboard. For that matter, check all of BullDog's advanced electrical products. BullDog Field Engineers will be happy to lend you a hand from planning to installation. No obligation, of course. Write BullDog Electric Products Company, Detroit 32, Michigan.

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IF IT'S NEW
. . . IF IT'S DIFFERENT
. . . IF IT'S BETTER . . . IT'S

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ELECTRIC PRODUCTS COMPANY
A Division of I-T-E Circuit Breaker Company

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You expect efficiency <u>everywhere</u> in your plant...

but here's one place you may have overlooked!

Company washroom costs are not often the object of management scrutiny. But the towels your company provides for its employees and customers represent a steady, continuing outlay—and maybe a much larger expense than necessary.

Don't let "cost per case" fool you

Too often towels are selected on the basis of price alone. But inferior towels can seldom do the job they are supposed to. They can't dry thoroughly—either because they're not absorbent enough . . . or because they're too small . . . or because they turn to mush in wet hands. When that happens an employee naturally has to reach for a second towel—or even a third towel. The savings you were supposed to get wind up in the waste bin.

Prove for yourself the economy of the ScotTissue Towel. *One* ScotTissue Towel dries *both* hands completely. The result is much lower consumption and therefore a lower cost per user. In other words, ScotTissue Towels deliver exactly what you pay for.

An extra bonus in Employee Morale

Scott towels are used by most of your employees in their own homes—so, naturally, they prefer to find them on the job. So soft that many people use them for face cloths, ScotTissue Towels stay strong and serviceable *even when wet* . . . something any user is quick to appreciate.

Test ScotTissue Towels yourself—prove their quality

The best way to evaluate ScotTissue Towels is to prove them against the towels you use now. Your local Scott representative will show you a simple consumption test that can result in substantial savings. Scott also has a "Planned Poster Program" which will do much to cut consumption and promote cleanliness in your washrooms. This program can be yours without obligation—write to Scott Washroom Advisory Service®, Scott Paper Company, Dept. FM-10, Chester, Pa.

It's good business to use

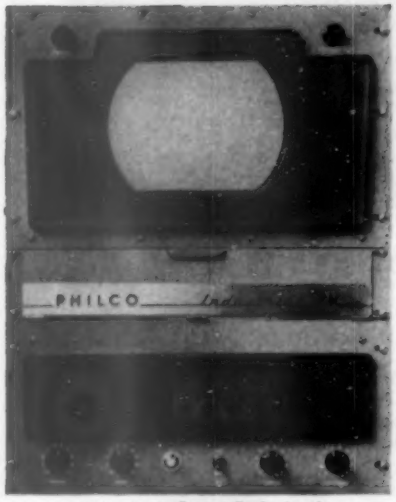
SCOTTISSUE® TOWELS

PHILCO *Industrial TV*

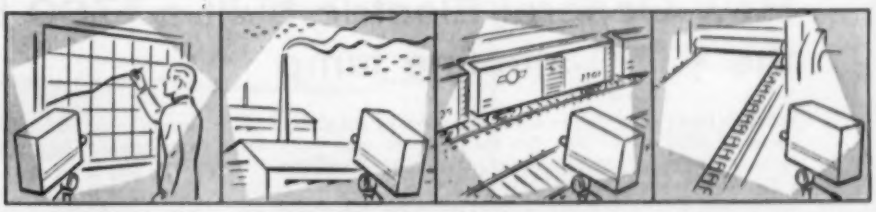
The Watchful Eye that *Never Sleeps!*

Now you can have 24-hour supervision of operations . . . perform a thousand and one tasks at a distance . . . in the next room . . . across town or many miles away. In steel, chemicals, railroads, scientific research . . . *in any industry* . . . Philco Industrial TV gives you a fast accurate picture of important operations . . .warns you of dangerous conditions . . . lets you direct progress just as though you were on the scene!

The amazingly compact Philco Industrial TV Camera fits in "out of the way" places . . . can be equipped for remote control of pan, tilt and lens adjustment. The super-sensitive camera easily picks up *all* the detail, even in dimly lighted areas and a powerful, high-definition monitor displays a crisp, clear picture in the room where *you* are. Here's complete control—*right now* saving industry thousands of dollars . . . precious hours . . . even priceless lives! Get complete data on the dependable Philco Industrial TV equipment. Write to Philco Dept. FM today.



Philco Large-Screen Professional TV Monitor and Control Units.



Instantly relays graphic information to vital points. Useful in factories, banks, retail establishments.

Warns of smoke violations. Affords constant protection of property in power plants and factories.

Keeps constant watch on cargo shipments night and day whether by rail, truck or air freight.

Scans production lines. Warns of mechanical failures. Ideal for steel, paper, auto manufacturers.

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GOVERNMENT AND INDUSTRIAL DIVISION • PHILADELPHIA 44, PENNSYLVANIA

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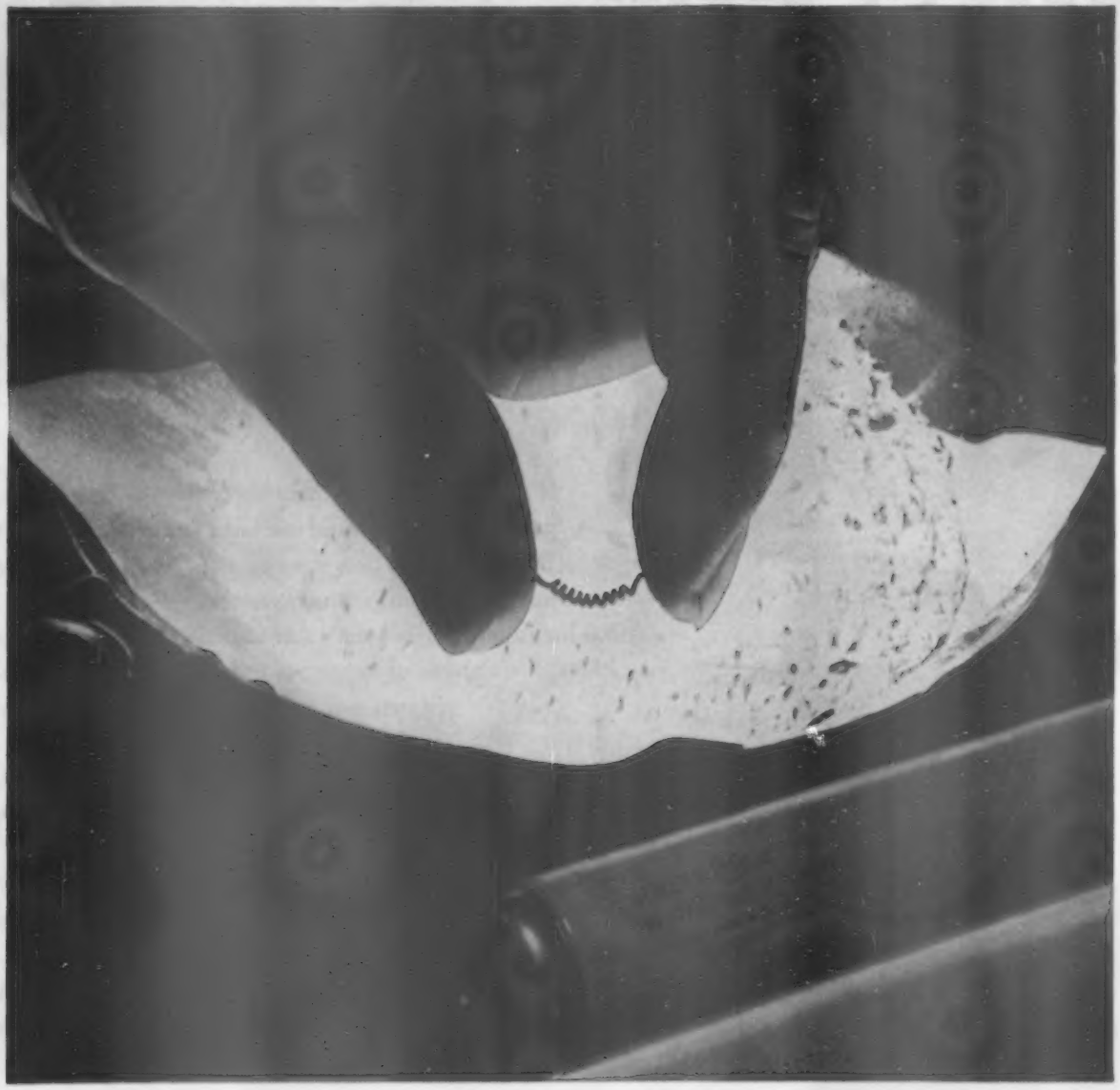
G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS



How General Electric built a $7.00 bonus into the $3.50 slimline lamp

MORE LIGHT. The picture above was taken by the glow of the chemical piled on the tray. It's the phosphor used inside the General Electric slimline fluorescent lamp to produce light. It's 19% brighter than it was five years ago. Holds its brightness better, too. Result: over the original 6000-hour life period, today's G-E slimline lamp gives 31% more light than the 1950 slimline.

LONGER LIFE. Silhouetted against the glow is a tiny coil of wire. It's the cathode that carries electricity to operate the lamp. It's coiled three times. It holds more starting chemical and holds it longer. This cuts down on early burnouts. And this is the main reason why today's General Electric slimline fluorescent lamp lasts 7,500 hours, compared to the old lamp's life rating of only 6,000 hours.

COSTS LESS. With the value going up like this, the price of today's General Electric slimline fluorescent lamp has actually gone down. Less than a year ago, a price reduction brought case-quantity buyers a net saving of 17¢ per lamp.

To add it all up, counting lamps, labor and electricty; the amount of light G-E slimline gives today would have cost *$7.00 more* only five years ago!

For more facts on how General Electric gives you more for *all* your lighting dollars, write for a free 16-page Progress Report to Lamp Users: Large Lamp Department, General Electric, Dept. 482-FM-10, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Jenkins designed for trouble-free performance... a

STAINLESS STEEL "Y"

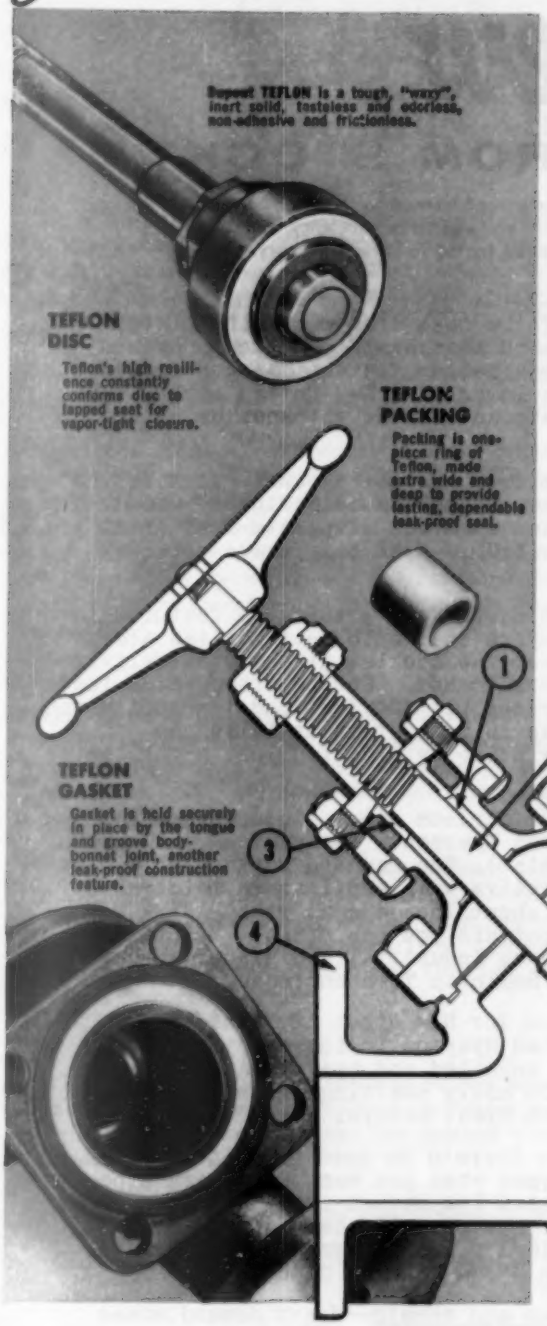
to lower costs in a wider range of

CORROSIVE SERVICES

For food and chemcial plants, and similar services, Jenkins Fig. 1335 "Y" Globe offers many advanced features that will lower operating costs and keep your processing lines trouble-free. The disc, packing, and gasket are tough, resilient Teflon. Tasteless and odorless, it eliminates problems of contamination.

The "Y" pattern permits full flow, nearly equal to that of a gate valve, and also provides the vapor-tight closure and the ease of disc renewal of a globe valve.

Fig. 1335 offers extra value by any test . . . *initial cost, operating efficiency, low maintenance.* You can convert this extra value into *extra savings* on your toughest corrosive services. Call your Jenkins Distributor, or write: Jenkins Bros., 100 Park Ave., New York 17.


Dupont TEFLON is a tough, "waxy", inert solid, tasteless and odorless, non-adhesive and frictionless.
TEFLON DISC
Teflon's high resilience constantly conforms disc to lapped seat for vapor-tight closure.
TEFLON PACKING
Packing is one-piece ring of Teflon, made extra wide and deep to provide lasting, dependable leak-proof seal.
TEFLON GASKET
Gasket is held securely in place by the tongue and groove body-bonnet joint, another leak-proof construction feature.
1
2
3
4

FULL, FREE FLOW
through Fig. 1335 is nearly equal to flow through a gate valve.

Fig. 1335 "Y" GLOBE
150 lbs. O.W.G. at 500°F
230 lbs. O.W.G. at 100°F
Sizes 1" to 4"

(1) **Packing Box**—Exceptionally deep and wide to hold optimum size packing.

(2) **Spindle**—Polished shank, long-operating threads, bevel shoulder for backseating.

(3) **Gland**—Two-piece for equalized pressure, tight seal.

(4) **Flanges**—Conform to M.S.S. Standard Practice S.P.42 Specifications.

JENKINS STAINLESS STEEL VALVE BOOKLET illustrates and describes wide range of Jenkins Globe, Gate, Check, and Y Valves, includes selection data, survey forms. Ask for Form 200-A.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros.

What's New

IN STEEL FROM STOCK

In the news today are many developments of interest to those who specify, buy or work with steel. Ways in which you can raise efficiency and lower costs in your operations may be suggested by the following summary.

Leaded plates—Now lead has been added to E-Z-Cut plate. As a result, E-Z-Cut, which was already considered one of the best free-machining plates on the market, is better than ever. Tests show that New E-Z-Cut cuts even faster, takes a sounder weld and polishes to a better finish than non-leaded E-Z-Cut. And because sulphur content is much lower, New E-Z-Cut is much cleaner steel, free from sulfide stringers. First stocks include thicknesses up through 3".

Biggest stainless steel plates now available from Ryerson stocks. This is the first time that 96" wide plates in thicknesses up to and including 1"—and heavier plates in 80" widths have been carried in stock at plants from coast to coast. Types on hand: 304, 304L, 316 and 316L. Next time, save welding on your big jobs with these bigger plates.

Delivered prices on tubing—Something new in simplified pricing is featured in a booklet just published by Ryerson. For buyers in the 16 metropolitan areas where large Ryerson tubing stocks are located, the booklet gives total delivered prices. There's no figuring to do—no factors to add. For buyers outside these metropolitan areas, a separate book gives prices per 100 feet and transportation charges. And beside every price in all books is a figure that tells you quickly and clearly when you can get a lower price by ordering just a few feet or pounds more. Copies on request.

Give steel-walled buildings a new look with stainless steel siding in mansard pattern, now available for quick shipment from Ryerson. (Galvanized and carbon steel sheets in mansard pattern also available.) The mansard pattern of widely spaced corrugations makes an unusually attractive wall and loss in total sheet area from pattern formation is slight—only about the same as with 2½" corrugated—previously the most economical pattern you could use. Maintenance-free stainless in mansard pattern also has many industrial and miscellaneous-architectural-ornamental applications. New Bulletin 70-5 on request.

New sizes of leaded alloys—Increasing demand for New Rycut 50, fastest machining .50 carbon alloy steel, has prompted Ryerson to increase the range of sizes in stock. Hot rolled rounds, both annealed and heat treated, are now available in large sizes—up through 9½". So heavy shafting, gears, cams, etc. can be produced at savings possible only with Rycut alloys.

Stainless pipe for welding applications—Now there's no need to wait for mill deliveries or to use expensive stabilized types when you want stainless pipe suitable for welding. Type 304L pipe, an extra low carbon type that eliminates the need for stress relieving after welding, has recently been added to Ryerson stocks. Size range: Schedule 40 welded pipe in commonly used sizes from ¼" through 2". Schedule 40 seamless in 3", 4" and 6" pipe sizes.

Supply situation on bars, structurals, plates and sheets—Heavy demand makes it difficult to keep all sizes of these products always on hand. However, we do have thousands of tons of steel ready for quick shipment and, since our stocks are being replenished continually, sizes that are not available today may be on hand tomorrow. So call us next time you need steel.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • PHILADELPHIA • CLEVELAND
CHARLOTTE • CINCINNATI • DETROIT • PITTSBURGH • BUFFALO • CHICAGO
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Looking Ahead in Business

There's a boom on in business spending for new plants and equipment. The Commerce-SEC Survey of businessmen's plans, just released, indicates that they will increase capital expenditures this year 4% over 1954 — to $27.9-billion. Final third- and fourth-quarter figures could be higher still. If they are, spending for plant expansion and modernization may hit a new peak this year.

Up to now the boom has been mostly in commercial building. Manufacturing companies have not spent as much in 1955 as they spent in 1953, the last record year. But manufacturers have revised both their building and equipment plans upward from earlier estimates. So look for outlays in this second half that will top actual spending in the first six months by at least 20%.

•

This surge in industrial building will continue in 1956. Capital spending for expansion and modernization may be as much as 10% to 15% higher in 1956 than in 1955. This will boost manufacturing capacity another 8% next year.

To meet the need for new and better machines, companies have upped their new orders in recent months. Orders for all types of non-electrical machinery are now higher than at any time since 1953. And they are continuing their spectacular rise. (See July and August figures on the chart.)

•

Why this very real boom in spending for new plants and equipment? Prosperous business plus higher production costs are major reasons why business is expanding and modernizing.

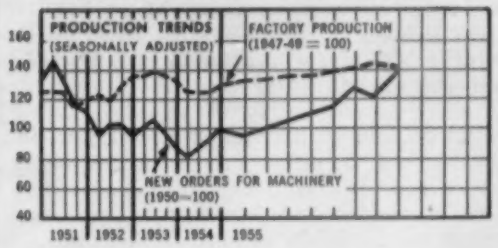
Also businessmen are betting that consumers will keep right on spending their record-high incomes in 1956. (Personal income is now over $304-billion, at an annual rate.)

•

So the expansion in capacity will be in consumer fields — autos, building materials, paper and rubber products. It's no longer tied to the defense program, which has been cut back.

In August the Office of Defense Mobilization froze 38 product classifications that were eligible to receive fast-tax-write-off privileges under the ODM program. It closed 19 other groups completely.

FACTORY'S FIGURES OF THE MONTH



Indicator	Aug.[p] 1955	July[r] 1955	Aug. 1954
New Orders for Machinery (exc. elec.)[1]	138	123	93
Factory Production[2]	142	141	128
Consumers' Prices (cost of living)[3]	n.a.	114.7	115.0
Industrial Prices (materials, supplies)[3]	117.4	116.5	114.4
Manufacturing Employment (millions)[3]	16.8	16.5	15.8
Total Employment (millions)[4]	65.5	65.0	62.3
Unemployment (millions)[4]	2.2	2.5	3.2

p = preliminary r = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. U.S. Federal Reserve Board (1947-49 = 100); 3. U.S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 4. U.S. Dept. of Commerce, Bureau of the Census.

In all, the freeze has affected about $6-billion of proposed defense-related plant expansion. But some suspended categories are being reopened. Over $31-billion of business spending since Korea has so far qualified for fast write-offs. The program is now nearly complete.

•

Where will industrial companies get the kind of money it takes to finance the large expansion programs that are now in the works? Many companies already have the funds available. Profits are way up. Depreciation reserves of most companies are also large. Industry will set aside over $14-billion more this year.

Also new depreciation formulas authorized in the 1954 tax law offer *all* industry — not just industries needed for defense — privileges that are about as attractive as the ODM program.

So it's clear that industry has plenty of money to finance its new plant and equipment program. That it is spending it, is a bright sign for the business outlook for 1956.

Looking Ahead in Labor

AFL-CIO merger is coming off on schedule — despite predictions to the contrary. Last-minute bugs are being ironed out by AFL's George Meany and CIO's Walter Reuther in private huddles. When the time comes for the official blending in early December, both sides will be ready.

Prognostications by the veteran labor leader, John L. Lewis, that the merger may not happen — or, if it does, that the organization will fall apart like a "rope of sand" — are taken lightly. Lewis's independent union, the United Mine Workers, is not included in the alliance. That's one reason for his position. He doesn't like being on the outside. Now, at age 75, Lewis is still a strong leader in his own mine union, but he's on the outs with Meany and Reuther. Past power clashes with Lewis have resulted in permanent animosities that will keep his miners out of the combined labor movement.

One of the toughest problems for Meany and Reuther is combining the headquarters staffs. There are two men for each top department job. But insiders say it's being settled by breaking up the departments into two divisions. For instance, the important research division will be divided into research and education groups. One will be headed by an AFL official, the other by a CIO man. Only deviation from this pattern will be in political operations. With next year's elections so close, the two big unions will set up co-directors of the single political wing.

There's still some opposition among AFL and CIO unions to the amalgamation. But it isn't strong enough to prevent the move, which will see the 15-million-member organization operating under one roof before 1956.

•

The National Labor Relations Board is split down the middle over federal labor policy. This means important decisions may be bottlenecked in the months ahead. With former chairman Guy Farmer off the Board, it means there won't be any swing man to break tie votes — a role that Farmer took over during his two years at the helm.

Voting by members won't always appear consistent but, generally, this is the assessment. Conservative, acting chairman Philip Ray Rodgers and member Boyd Leedom; liberal, members Murdock and Ivar H. Peterson. With no immediate successor to Farmer, these four have been divided on many key rulings. On the eve of Farmer's leaving, the NLRB turned out a number of key decisions with a majority holding these views:

• *A contract agreement to send all grievances to arbitration has the same effect as a no-strike clause.* A union must conform to arbitration procedures; to strike over grievances is illegal.

• *An employer acts illegally when he calls employees into his office for interviews prior to a representation election.* But he can talk to them at their work for short periods about a coming election without committing an unfair labor practice. In essence the conflicting decisions mean management must be cautious in opposing unions; it's basically a matter of common sense.

• *A union can refuse to handle "non-union" goods, provided it's in the contract and the employer leads in upholding the contract.* The union cannot order its members to abstain from using non-union goods; such an order must come from management or it's an illegal secondary boycott, even though it's part of the contract.

• *A union can bargain away its rights to wage data from an employer for bargaining purposes.* This is a qualification of the long-standing rule that management must furnish payroll data to a union on request. Now, if a union agrees not to demand such information, an employer does not have to furnish it, even though the union later changes its mind and reinstates its request.

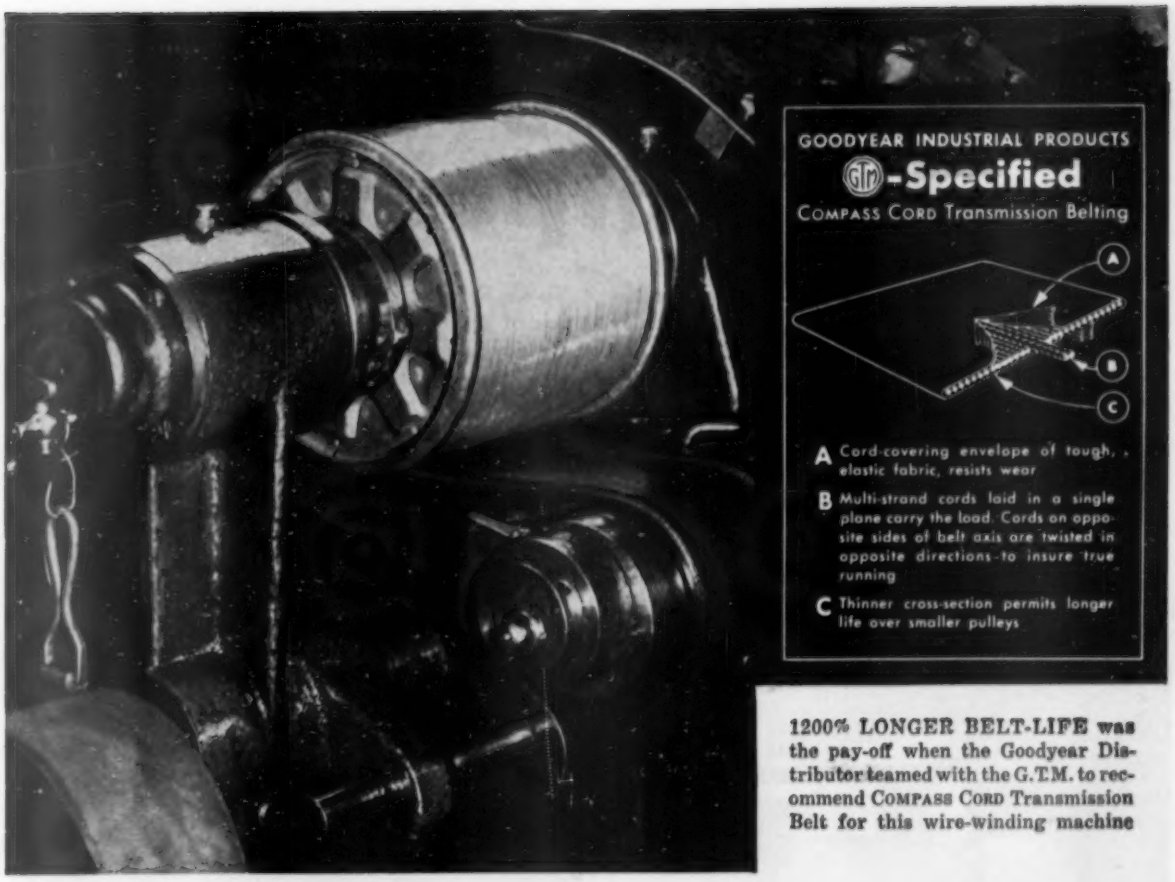
• *Employers cannot insist on a secret ballot among employees before a strike is called.* This, says the NLRB, is an attempt to bypass union officials to deal individually with the workers and is an unlawful maneuver.

•

An analysis of this year's bargaining reveals the biggest wage settlements in 10 years. The top is the $2-a-day pay boost for coal miners with many other settlements around 15 cents an hour. The average is just under 10 cents, but a big hike from last year's 5-cent agreements.

The reason behind these settlements is management's belief that the high-level economy will continue for the next few years. Many employers agreed to long-term contracts with periodic wage increases. And, in some cases, key industrial companies granted costly contracts long before the deadline.

SEE LABOR RELATIONS NEWS, PAGE 234


GOODYEAR INDUSTRIAL PRODUCTS
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A
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C
A Cord-covering envelope of tough, elastic fabric, resists wear
B Multi-strand cords laid in a single plane carry the load. Cords on opposite sides of belt axis are twisted in opposite directions to insure true running
C Thinner cross-section permits longer life over smaller pulleys

1200% LONGER BELT-LIFE was the pay-off when the Goodyear Distributor teamed with the G.T.M. to recommend COMPASS CORD Transmission Belt for this wire-winding machine

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GOODYEAR

THE GREATEST NAME IN RUBBER

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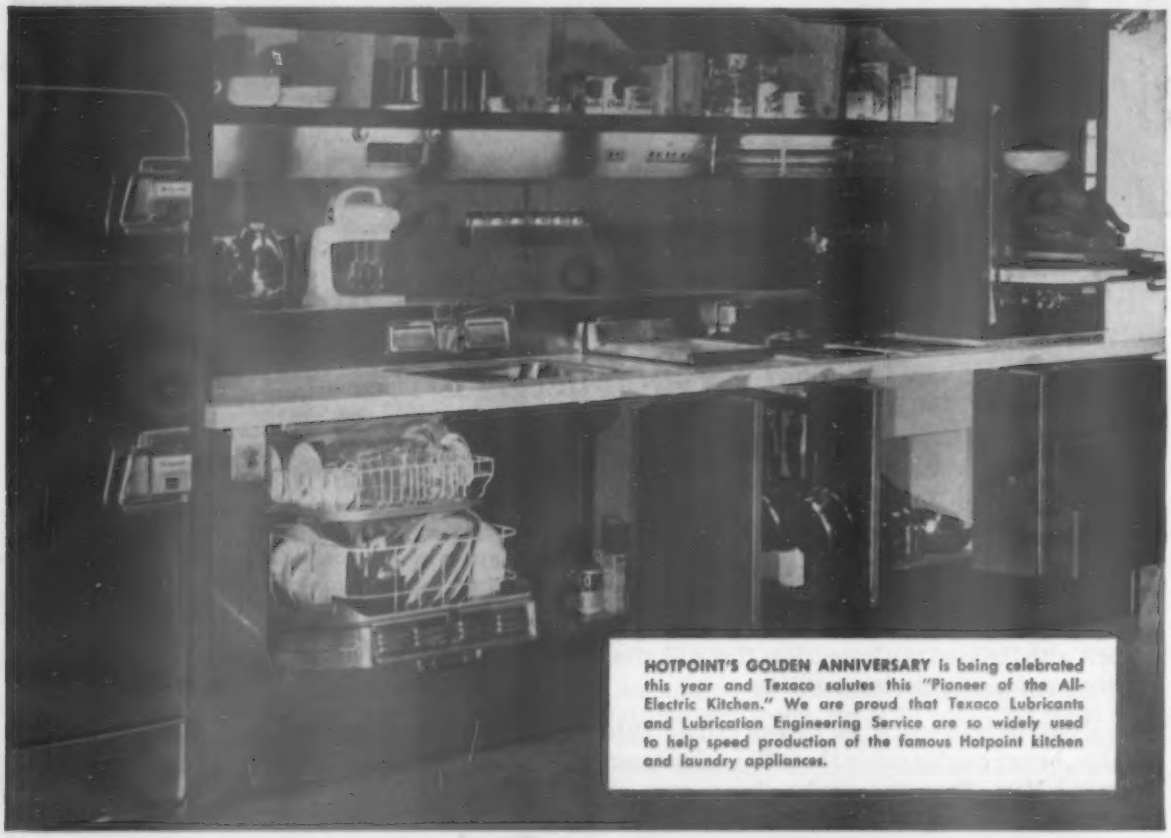
Cool savings for Hotpoint...

For the past five years, Hotpoint Co., Milwaukee, has been using *Texaco Regal Oil R&O* in all its hydraulic equipment, air compressors and turbines. And here's what L. E. Sweet, Plant Manager, has to say about it:

"*Texaco Regal Oil R&O* has done a consistently fine job for us. It keeps our hydraulic, turbine blower and compressor systems exceptionally clean — no rust, no sludge, no foam. Since we changed to Texaco we haven't had a single production delay due to oil failure. Our savings in reduced downtime and maintenance costs have been very worth while."

Texaco Regal Oil R&O is just one of the complete line of Texaco Industrial Lubricants developed with the aid of the finest research facilities to help industry step up production and bring down unit costs.

Let a Texaco Lubrication Engineer give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



HOTPOINT'S GOLDEN ANNIVERSARY is being celebrated this year and Texaco salutes this "Pioneer of the All-Electric Kitchen." We are proud that Texaco Lubricants and Lubrication Engineering Service are so widely used to help speed production of the famous Hotpoint kitchen and laundry appliances.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

TUNE IN... TEXACO STAR THEATER starring JIMMY DURANTE on television... Saturday nights, NBC.

Good News: New Equipment Will Be Easier to Maintain

THE MACHINE TOOL and Production Engineering Shows in Chicago last month more than lived up to expectations. They gave the most dramatic evidence we've had to date of the progress made by U. S. industry in machines, equipment, and technology.

But both shows did something else—something not quite so obvious but almost equally important to thousands of plant operating executives. They highlighted the growing "maintenance consciousness" of equipment manufacturers.

At exhibit after exhibit, FACTORY's editors saw evidence of the successful drive for built-in maintenance simplicity. Typical examples:

Plug-in replacement units—More than one manufacturer segregated complicated electronic control circuits in "little black boxes" that plug into automatic equipment and can be replaced as units in case of breakdown. Fact is, plug-in replacement units are becoming almost commonplace in control circuits.

Accessible parts — Numerous manufacturers called attention to new designs that enable maintenance men to get at parts more easily.

Standardization—You heard frequent reference to standards aimed at insuring uniform and interchangeable parts. For example: JIC (Joint Industry Council) standards and NEMA (National Electrical Manufacturers) motor standards.

In general: Designs show evidence of being cleaner, safer, more accessible, more maintainable. But, if you're worrying about space, rest easy. If anything, equipment looks more compact and space-saving than ever. When you consider that equipment is generally getting more complex, that's real progress.

Now all this, we know, is good news to plant operating men—especially, of course, to hard-pressed maintenance executives. These men have repeatedly voiced their concern over how to find and train maintenance craftsmen to contend with today's technology in production and service equipment.

But, despite all this progress, we're sure still more can be done. So, on behalf of the men who run our plants, we hope manufacturers will keep right on moving in the same forward direction. If they do, we'll all be better off.

We Need Action Now on Air Pollution

IT IS a discouraging and irritating experience to FACTORY's editors to visit fine industrial areas that are marred by choking, malodorous smogs and semi-smogs. The discouragement and irritation come mainly from a realization that almost always a small minority of companies are guilty—or *seem* to be guilty—of the crime.

Admittedly it's expensive for some plants to stop polluting the air around them. Sometimes, in fact, it seems almost impossible. But, once you look at the consequencs of failure to clean up, you find it hard to be sympathetic, regardless of how tough or costly the job looks. Aside from the bad public relations impact on the guilty plant, consider these facts:

1. The bad practices of the few give the general public a poor impression of all plants in an area. And give political groups meat for unjustified criticism.

2. Air polluters drive new industry away. Also labor force, because workers tend to want to settle as far away from the offending area as they can get. This raises recruiting costs, reduces skill levels available.

3. Most important of all, the small minority of industrial air polluters often divert attention from the *real causes* of irritating hazes and smogs. Private incinerators and heating plants, burning garbage dumps, and similar non-industrial installations are often the chief offenders. But industry is easiest to point at, and usually gets blamed.

What can *you* do? A lot. Just by getting as stirred up as we are. Start with your own plant. *Clean up at home first.* Today. Then raise merry hell with your neighbors.

This is no time for pussyfooting. There is a growing national indignation over air pollution.

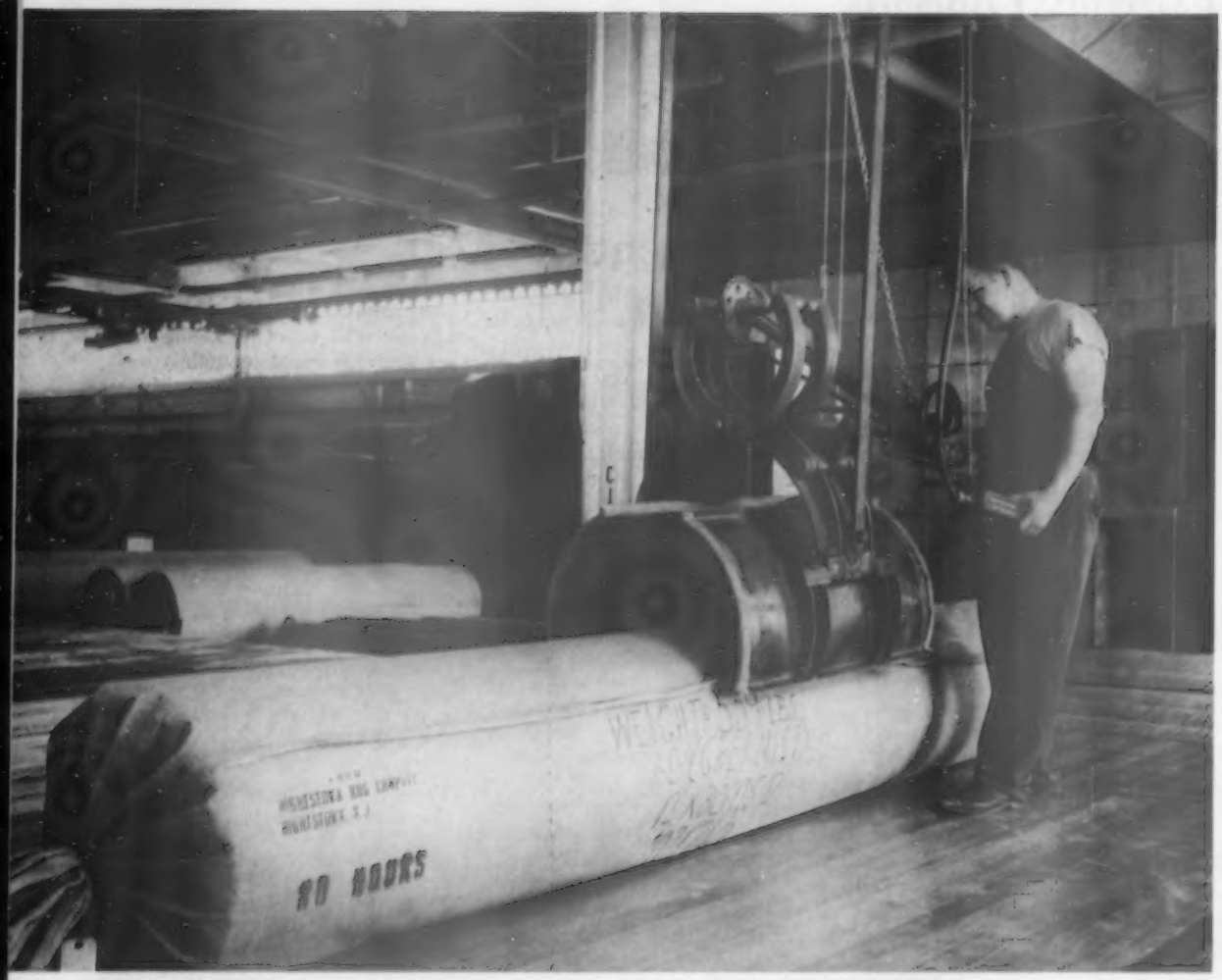
Sharing Ideas: Our Greatest Asset

ONCE IN A WHILE it's worth a minute to think about something we all take for granted. Cooperation between operating men, for example. Foreign visitors invariably mention it, since it's rare elsewhere. Yet here willingness to share ideas and experiences is a great asset. How great is illustrated by a recent experience of FACTORY's editors.

When the disastrous floods hit six northeastern states, our whole staff dropped everything to turn out a special bulletin which we rushed to readers in flood areas. It meant asking help from men with flood rehabilitation know-how all over the country.

They had to drop everything, too. And did. With the greatest of interest and good will.

That's a dramatic example. But it's typical of what plant operating men do every day. It's what makes our job as editors so stimulating.



VARIATION ON AN ICE TONG. That's what you might call this attachment used to carry rolls of finished carpet beween looms and storage area. By turning handle (as operator is doing in photo), rubber- and fabric-lined jaws close over roll of carpet, clamping it securely for transport. All four cranes are operated from floor by pendant control.

Making All Moves by Crane

Not only is every square inch of floor space in this new plant covered. So's every conceivable job—thanks to smart planning and the right crane attachments.

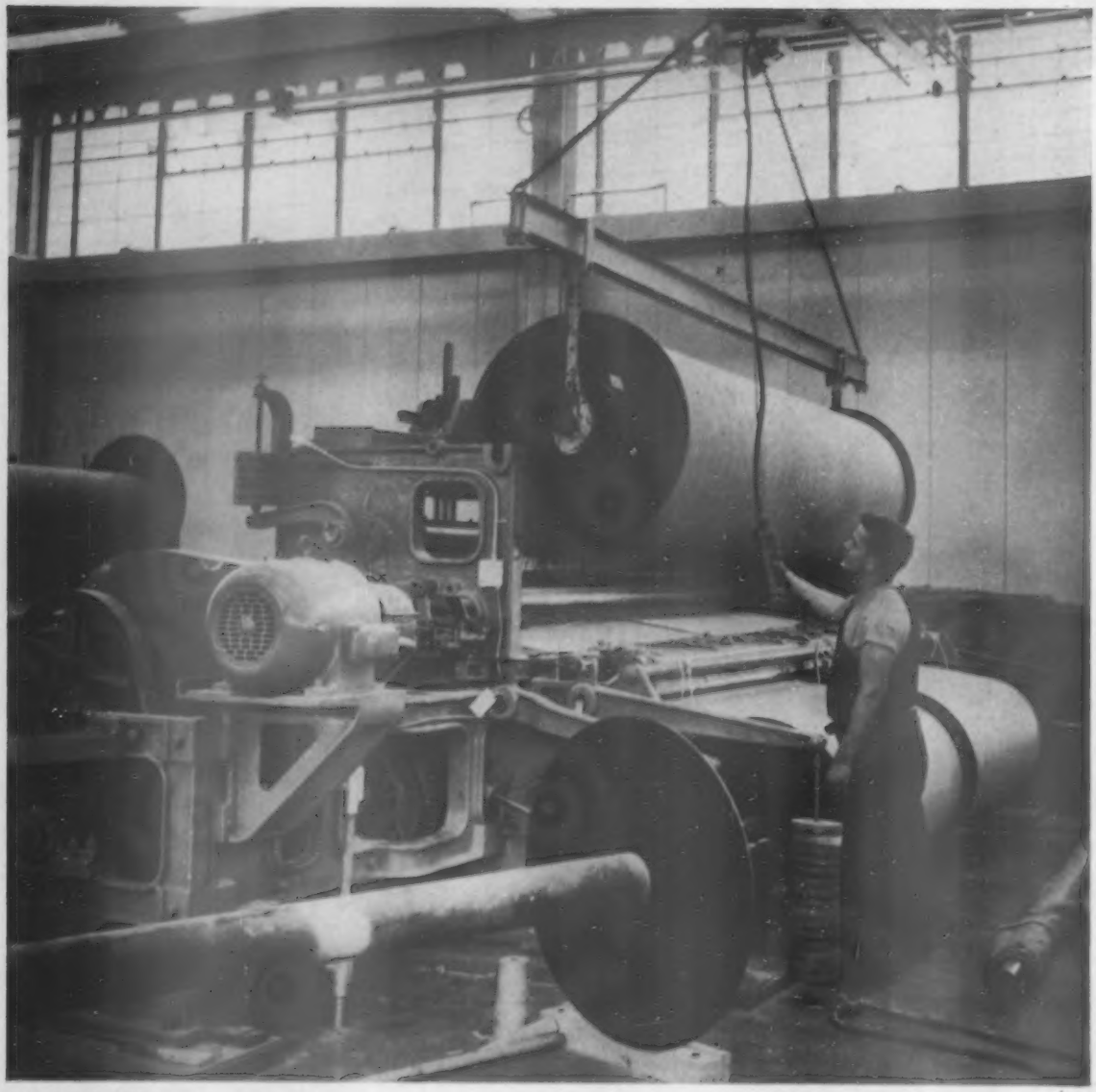
YOU SELDOM SEE a plant where cranes do all the handling. And we doubt if you'll ever find one that gets more mileage out of its cranes than Hightstown Rug Company does.

Reason: Every inch of floor space in its new 52,000-sq.-ft. plant at Hightstown, N.J., is covered by one of four cranes. And what lifts the installation out of the ordinary is the way company engineers have devised attachments to let the cranes do a wide variety of handling jobs in what would otherwise be idle crane time. Which means the need for other handling equipment is eliminated.

Why cranes—It was obvious from the start that cranes would be just the ticket for the kind of handling called for. Loom beams—reels of wool to most of us—are large (40 inches in diameter, 15 feet long) and heavy (up to 2 tons). So craneways were installed in both bays, with two 2-ton, 50-ft. cranes per bay. The photos on these pages show you some of the attachments that extend the usefulness of these cranes. They all seem to us to be adaptable to operations far afield from rug manufacture—including, maybe, your own!

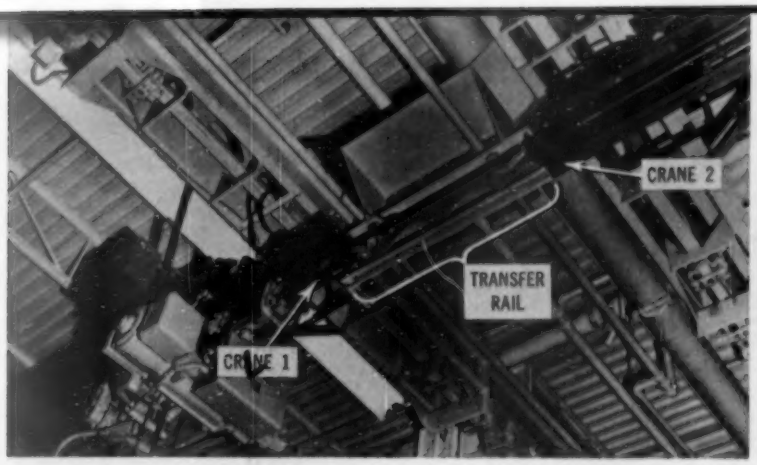
Turn the page

ROLLS CAN BE UP-ENDED easily by using another handle on same attachment. This makes it a simple matter to get rolls—which are horizontal when operations are completed—into vertical position for storage, minimizing space required.

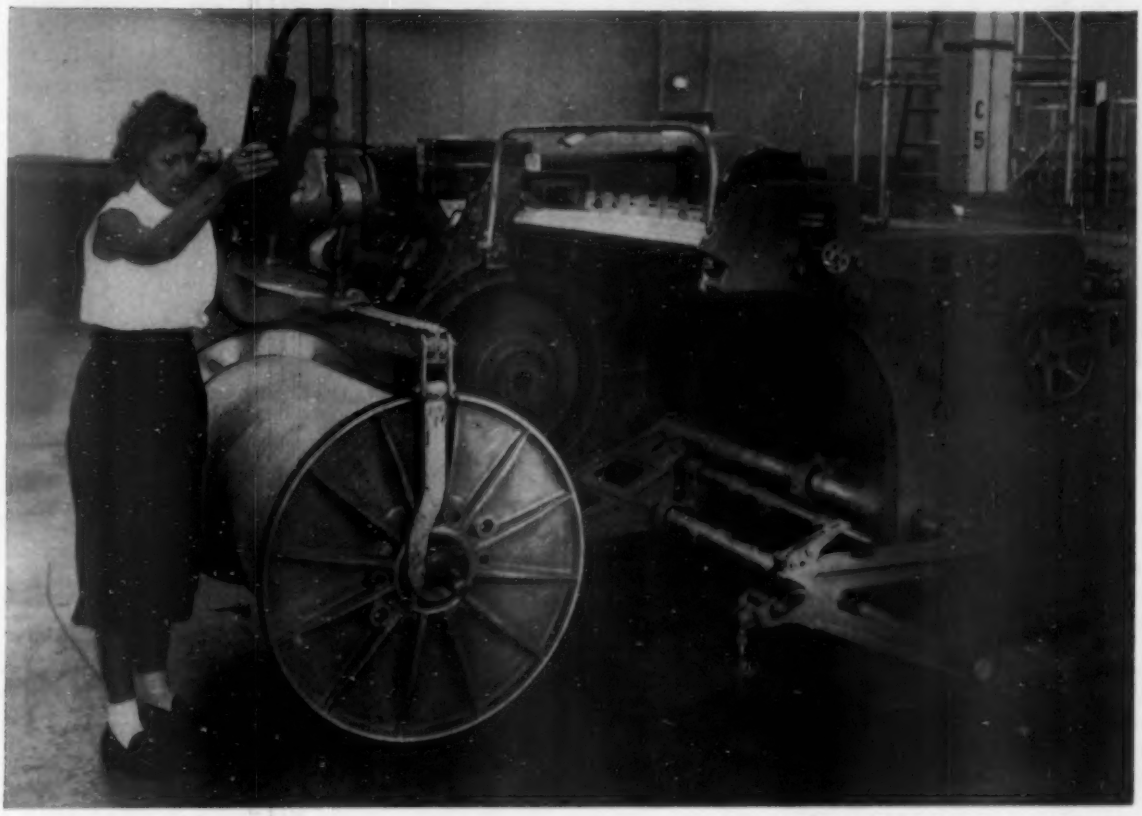


ADJUSTABLE YOKE moves heavy (up to 2-ton) loom beams of wool. As beams come in varying widths, according to rug being loomed, distance between supporting hooks can be varied by sliding collars in and out on cross member. Capacity here: 15 feet. Since loom beams have no axle, a bar is placed through center to engage hooks.

FLOOR RACKS used throughout shop can be seen here. Indentations on rack keep beams from rolling, make it easy for operator to spot beams when lowering them to in-process storage. Yoke attachment is similar to one above, but smaller. It's used for transporting jute and cotton loom beams, which run up to 7½ feet long and 32 inches in diameter, weigh up to 1800 pounds.

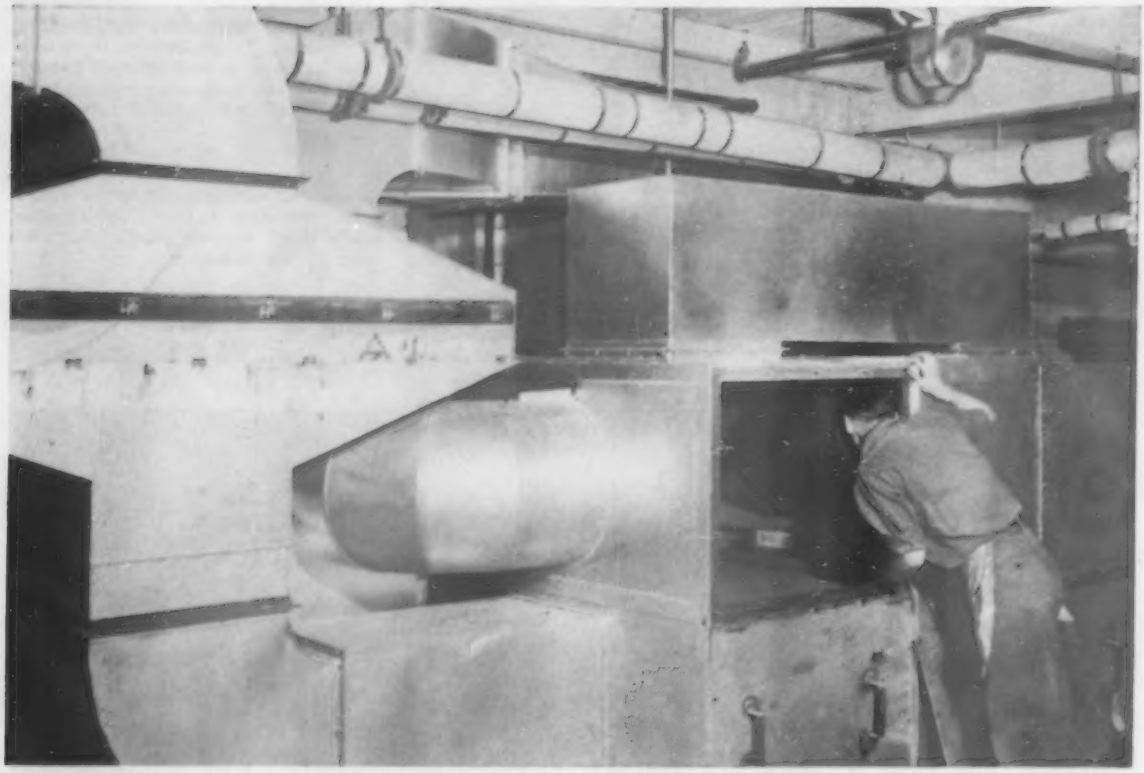


TRANSFER RAILS are used when it's necessary to move a load from one bay to the other. To use transfer, crane with load (crane 1) is lined up with transfer rail. A crane in the other bay (crane 2) is also lined up with transfer rail. Then operator sends load, crane carriage and all, onto crane 2. When unit is unloaded in other bay, crane 2 returns to transfer point, and unloaded carriage is moved back onto crane 1. Three transfer rails along length of shop provide plenty of mobility between bays.



YOKE ATTACHMENT is used to handle jute and cotton service warps. As length is standard, this attachment is not adjustable. Interesting sidelight: Warp is lowered from warper (machine at right) by hydraulically actuated unloading mechanism visible just to right of warp. Close glance at photo will show quick-opening bearing in which axle of warp rests when it's on the machine.

ICE TONG is used to lift baskets of cops (small packages of filling yarn) in and out of the vacuum impregnator in the background. Note: As crane takes a strain, lugs on attachment are forced outward into lifting ears on basket.



HEAT EXCHANGE UNIT receives clean outside air through duct at left. And, after it's filtered, warms it with Btu's taken from contaminated air. Opening shows outlet side of duct for cooled exhaust air, bound for the great outdoors.

Now—Heat From Exhaust Fumes

Here's a hot idea. For any plant that's "heating all outdoors" with hot exhaust. From a company down East (where winters are nine months long). Seems a simple heat exchanger is keeping plant and people cozy and warm, even on sub-zero days.*

FOR TWO WINTERS a large paper manufacturer down in Maine reluctantly pumped billions of Btu's of heat in waste air into the cold blue yonder.

The company wasn't trying to take the chill off the city. It had to jettison the hot air because it contained undesirable vapors from a high-speed printing press.

"There just wasn't any practical way to re-use that bad air," said the plant manager.

That was two years ago. Since then this plant has installed a Therm-O-Wheel (made by Therm-O-Wheel, Inc., Far Rockaway, N.Y.). This is a heat exchanger, in principle, which transfers heat from the outgoing bad air to incoming fresh air. In action, a revolving "squirrel-cage" wheel filled with porous aluminum wool absorbs heat as the wheel slowly turns one-half circle through a slot in the exhaust duct. Then the wheel releases this same heat to incoming air as it continues to revolve another half circle through a slot in the fresh-air duct. The two heat-exchange chambers—exhaust and fresh air—are sealed from each other.

So now, the once-wasted Btu's are being salvaged and returned to heat the printing room.

Fast payoff—The heat recovery system has saved considerable fuel used for space heating. It has already paid back more than double the $3000 it cost. Savings run $15 to $20 each day wheel is operating.

Equally important, says the company, is the assurance of good ventilation and comfortable working conditions to maintain quality production. The printing room is a key finishing operation for paper napkins, one of the company's chief products.

**Editor's note—The company involved shuns publicity and prefers to remain anonymous. But it has cooperated with FACTORY in making available the facts about this plant engineering achievement.*

CLOSE-UP VIEWS show what makes heat exchanger tick. Wheel at left is the heart of the unit. Panel must be removed twice yearly to clean off dust. The outside air filters at right takes the punishment, are cleaned every 6 to 8 weeks.

PROBLEM

The root of the ventilation problem is a fast-drying chemical—toluol—which is used to liquidize the printing ink. The allowable concentration of toluol vapor, according to state health department standards, is 200 parts to 1,000,000. In a higher concentration, toluol fumes can be toxic to personnel as well as potentially explosive.

The company depended on a suction blower suspended over the press. This exhausted the fumes created as the toluol was evaporated by steam-heated units inside the press. At times there was vapor leakage both around the press and from a vent duct in another part of the room.

SOLUTION

The Therm-O-Wheel allows good ventilation with little waste of heat. Hot vapors are pulled from the press, blown through upper half of the slowly rotating (20 rpm.) wheel, and diffused harmlessly into the sky. Outside fresh air is pushed through lower half of the wheel, heated, and blown into printing room.

Company engineers conducted a thermal test on the wheel when outside temperature was 5 above zero. Wheel was operating at its design capacity—3000 cfm. intake and exhaust. When the hot vapor hit the wheel, it had a temperature of 160 F. Engineers found that, in passing through the wheel, temperature dropped from 160 to 34 degrees. At the same time, fresh air rose from 5 to 125 degrees as it flowed through. This represents almost 80% thermal efficiency.

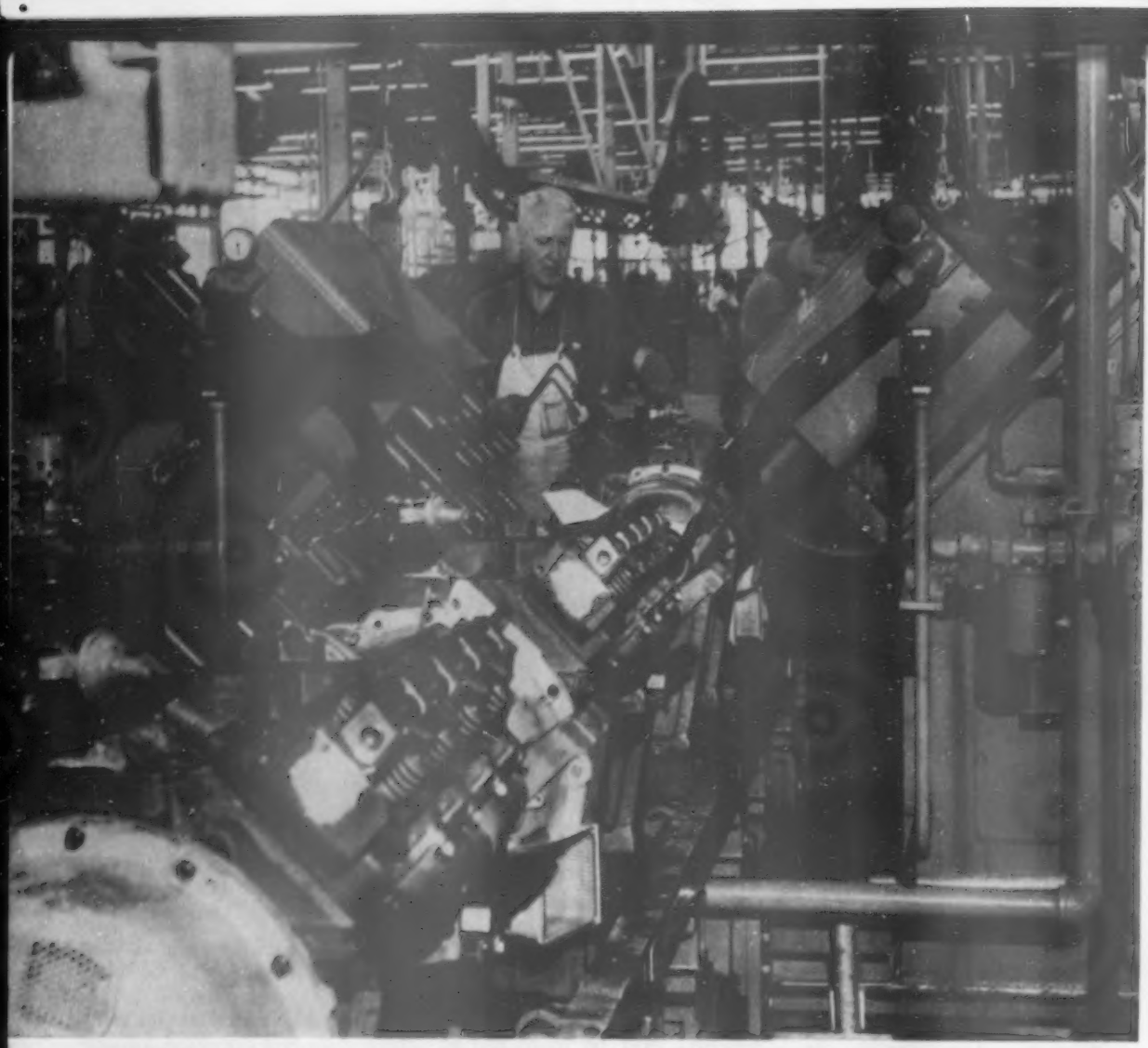
Such efficiency is enough to provide adequate space heating of the printing room. This room is 93,240 cubic feet (111x84x10). Only when the mercury plummets to 20 or 30 below zero is supplemental heat necessary. If the room chills off, thermostatically controlled steam unit heaters switch on automatically. Even at zero, however, the system can keep the room at a pleasant 70.

In the warm months the heating function of the wheel is cut off by bypass dampers. The hot vapor is exhausted directly outside. Fresh air is brought into the room through the system without heating.

Periodic tests have shown that only a minor fraction of the toluol fumes are being retained in the wheel and borne back into the plant. With the wheel operating, concentration of fumes at the duct inlets averages 50/1,000,000 parts and at the press 100/1,000,000.

Low maintenance—In its two years of operation system has required only minor routine maintenance. Electric motors and blowers that move the air must be checked regularly. Fresh-air filters must be cleaned every 6 to 8 weeks. Wheel is inspected and cleaned every 6 months.

"With proper maintenance the system should last 20 years in the shape it is now," is the company's view. One thing it found essential was to filter the fresh air before it enters the wheel. Otherwise outside dust and dirt clogged the wheel and coated the aluminum wool, resulting in a loss of heat-exchange efficiency. So far there have been no breakdowns. If one should occur, plant engineers point out that the toluol vapors could still be effectively exhausted by the old system.



ASSEMBLY OF ENGINES is virtually automatic. The air-powered nut-runner shown here is just one of 72 stations on the highly mechanized 560-ft. final assembly line. Overhead conveyors feed parts and subassemblies to operators all along line. Operators position them, machines take over and secure them. Standby portable tools insure continuous production.

New High in No-Hands Assembly

The "forward look" at Plymouth's new engine plant starts, but doesn't stop, with automatic production. There's no-hands testing and maintenance, too.

VERY LATEST in automated engine plants has just been unveiled in Detroit by Plymouth Division of Chrysler Corporation. A glance at the photos on these pages will show you that, while Plymouth engineers spared no horsepower in mechanizing their production, they did just as futuristic a job on often-bypassed maintenance and test activities. Which is probably most of the reason why the plant can turn out 600 V-8 engines a day with no strain. Company engineers figure on a boost to 3000 a day on a planned schedule.

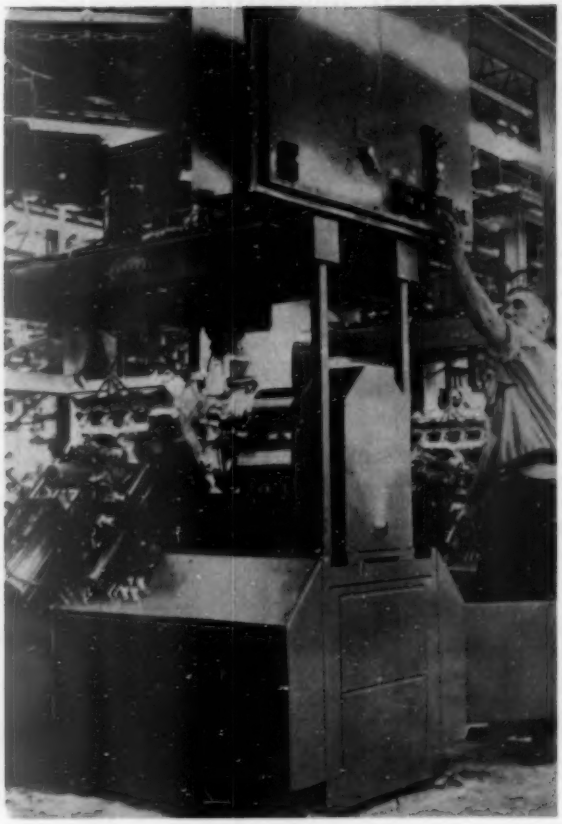
Not pictured, but noteworthy:

. . . *Just 14 months elapsed* from start of engine design to plant start-up. Key short-cut: Machine builders contracted for complete production units, with subcontracted parts.

. . . *Standardization of machines* and bases permits quick interchange and replacement.

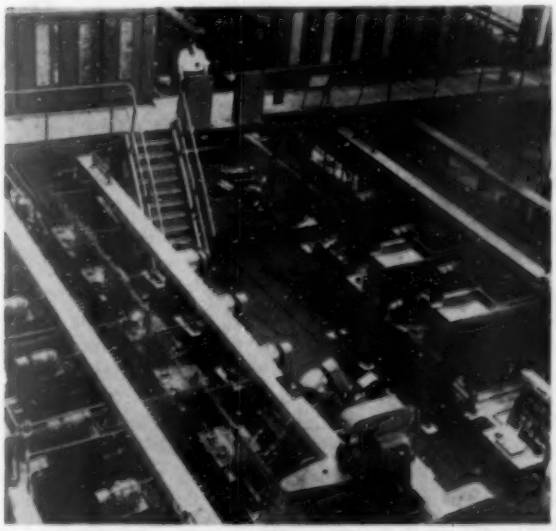
. . . *Horizontal spindles* (instead of more-common vertical spindles) on most machines provide better tool accessibility, greater rigidity.

. . . *Ranch-house-size broach* machines both ends of block at once.

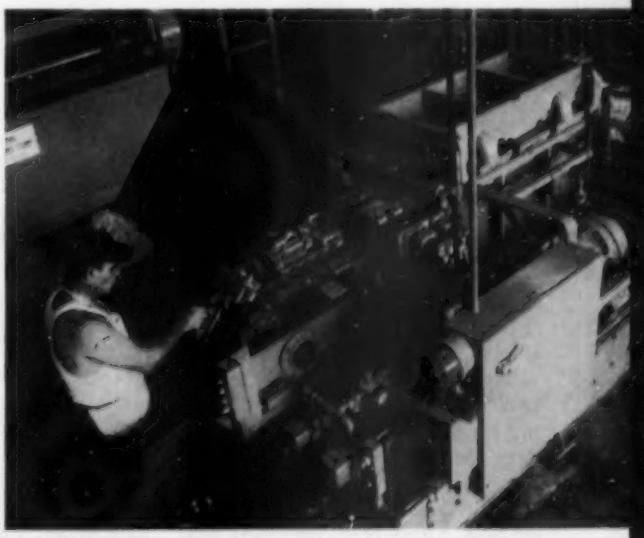


NO-HANDS TESTING is another highlight. This is a final engine test stand. Conveyors move completed and painted engines to one of 72 units like this. Oil, water, and natural gas (safer and more economical than gasoline in this case) are automatically fed to engine. After 20-min. run-in, the unit signals test results to inspector by means of lights.

SUBASSEMBLY wasn't slighted by company engineers. Case example: rocker-arm assembly. Operator positions arms over locating studs on indexing table. Vibratory hopper-feeders (one at each side of table) position screws at two rotary spindle heads (visible at top of machine). Two stations of indexing table eject subassemblies automatically.



BUCK-ROGERS MAINTENANCE, TOO. Operator on bridge (background) oversees the cylinder-head machining line beneath him. The panels behind him are electric "Detecto" panels. In case of trouble on the line, he inserts a probe into one after another of the contact holes on the panel. Each represents a line component. A flashing light pinpoints the fault.

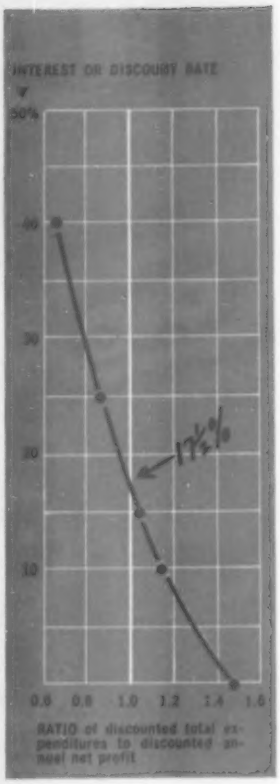


ONLY LABOR on this continuous broaching operation is positioning. The operator places connecting-rod cap forgings into fixtures on the moving conveyor. Parts are then automatically clamped, and carried through first broach. Automatic ejection, transfer, and clamping devices move parts through two successive broaching operations.

HOW TO FIGURE PROFITABILITY OF CAPITAL INVESTMENT

TIMING	1 0% INT. Actual Amts. Disbursements	2 10% TRIAL INT. FACTOR	2 10% TRIAL INT. PRESENT VALUE	3 15% TRIAL INT. FACTOR	3 15% TRIAL INT. PRESENT VALUE	4 25% TRIAL INT. FACTOR	4 25% TRIAL INT. PRESENT VALUE	5 40% TRIAL INT. FACTOR	5 40% TRIAL INT. PRESENT VALUE
During year before		1.0517		1.0789		1.1361		1.2296	
At "zero time"	$1,000	1.0000	$1,000	1.0000	$1,000	1.0000	$1,000	1.0000	$1,000
During 1st year		.9516		.9286		.8848		.8242	
TOTALS	$1,000		$1,000		$1,000		$1,000		$1,000
	NET PROFIT*								
1st year	$300	.9516	$285	.9286	$279	.8848	$265	.8242	$247
2nd "	300	.8611	258	.7993	240	.6891	207	.5525	166
3rd "	300	.7791	234	.6879	206	.5367	161	.3703	111
4th "	300	.7050	212	.5921	178	.4179	125	.2482	74
5 " "	300	.6379	191	.5096	153	.3255	98	.1664	50
6 " "		.5772		.4386		.2535		.1115	
7 " "		.5223		.3775		.1974		.0748	
8 " "		.4726		.3250		.1538		.0501	
9 " "		.4276		.2797		.1197		.0336	
10 " "		.3869		.2407		.0933		.0225	
11 " "		.3501		.2072		.0726		.0151	
12 " "		.3168		.1783		.0566		.0101	
13 " "		.2866		.1535		.0441		.0068	
14 " "		.2593		.1321		.0343		.0045	
15 " "		.2347		.1137		.0267		.0030	
16 " "		.2124		.0797		.0208		.0020	
17 " "		.1922		.0686		.0162		.0013	
18 " "		.1739		.0590		.0126		.0009	
19 " "		1573		.0508		.0098		.0006	
20 " "		.1423		.0437		.0076		.0004	
TOTALS	$1,500		$1,180		$1,056		$856		$648
RATIO	1.50		1.18		1.06		.86		.65

*Receipts less expenditures after income taxes but before depreciation.



WORKSHEET AND GRAPH make it easy to figure investment payoff. With ready-made factors on worksheet, calculate present value of future investment and income at trial interest rates. Then derive ratios which, when plotted, will guide you to a Profitability Index (17½% here). PI will tell you how much an investment will pay—whether to spend your money.

Newest Way to Figure Payoff...

... is the Profitability Index. It's a brand-new tool that will predict profits from new machines, new equipment, new buildings. It will win top support for your ideas. It's sure and fast. And you don't have to be a figure wizard to use it.

WANT TO FIGURE payoff for the new machines and equipment you're thinking of buying? Fast and accurately? The "Profitability Index" (PI) may be just what you're looking for. It's a quick and easy tool developed by plant men for plant men to use. Among several proposals, it spots the one that will pay off best. Gives plant operating men a new persuader to use on the accounting department (where lots of their proposals get questioned on grounds of profitability). Speeds proposals convincingly through internal channels. And sets the stage for okays from finance committees, boards of directors, or others involved in really big appropriations. Best of all, you don't have to be a whiz at figures to use it.

By RAY I. REUL, Industrial Engineer
Chemical Divisions
Food Machinery & Chemical Corporation
New York

PI is a simple, accurate system for forecasting the profitability of an investment. What makes it better than other systems?

... It's easy to master. Plant operating men don't have to be accountants to do the computations.

... It's reliable. It takes all the fixed and variable factors into account. Gives an answer you can depend on. Gets rid of "hunch" decisions. Provides the best estimate of all related data before decisions are made.

... It's flexible. You can use it to weigh the merits of purchase vs. lease of equipment; costly, long-life equipment vs. inexpensive short-life equipment.

... *Its figures are directly comparable* with each other (showing clearly the best course to take) and with bank interest rates. For instance, if you have to borrow money at 4% to finance an equipment investment with a PI of 14% — and if the income tax rate is 50% — then the net PI will be 14% minus 2% (4% x 50%), or 12%.

... *It audits currently operating projects at any time.* Just insert past expenditures and receipts on a PI calculation form (see worksheet at left), add latest predictions for future expenditures, make the calculations. Then compare what you've got with the predictions you made when the project was first analyzed — and there's your audit.

... *It fits all investments.* You can always calculate the PI if you know the amounts and times of disbursements, and if you can predict savings year by year. For example, if the equipment you buy will still have useful life after the project is ended and can be used or otherwise converted to income, just add the profits from sale or other disposal at the time you expect such profits, and include in your calculations.

Tough problem, easy shortcut — In forecasting profits from investment, most plant men stick to the cut-and-dried rules of thumb, such as "pay-out" or "rate of return." These methods are easy, but often give unreliable answers (panel, right). Yet any more accurate method begins to get into heavy mathematics—complex and tedious discounting and compounding of interest. So plant men shy away.

Now, with PI, you've got a simple-to-calculate shortcut that enables you to compare all investment projects on a single scale. Here's the thinking behind it:

PI evaluates an investment project by comparing the value of future incomes from the project with expenditures needed to finance it. PI is that rate of interest which, applied to the proposed investment, will yield annuities exactly equal to —and concurrently with—the anticipated yearly cash flow-back (or savings) after income tax. It's known also as the "discounted cash flow method" and "investor's method."

Take it this way: If you invest 38¢ at 10% compound interest for 10 years, it'll be worth $1 at the end of the 10 years. Computing or discounting in reverse, $1 due 10 years hence is worth only 38¢ right now—at the same 10% compounded. PI uses this reverse discounting. It discounts backwards all predicted annual savings, thus finds what their worth would be at the time of investment. The interest rate that causes the discounted value of future incomes to be exactly equal to the amount of money to be invested now is the PI of the project in question. Sounds tough. But it's pretty simple if you use the worksheet and the graph on the opposite page.

How to figure a Profitability Index

You'll need to know five things:

... *Total investment expenditures,* plus time schedule for them.

... *Annual cost savings* (cash flowback) that the project will return to you.

... *Useful life of equipment.*

... *Probable depreciation allowance.*

... *Expected income tax rates on profits.*

Sample calculations are plotted for you on the worksheet. They include: (1) *compounding forward* to present value all cash disbursements before "zero time" (the start of the first year in which you expect the investment to begin saving money), as indicated for four trial interest rates; and (2) *discounting backward* to present value all disbursements and net profits (savings, or receipts less expenditures after income taxes but before depreciation) after "zero time," again using the factors indicated for four trial interest rates. Total of present value of net profits for each interest rate is then divided by present value of disbursements for the same interest rate. A ratio of 1:1 indicates the actual interest-rate value of the investment. This ratio is found by using the graph to plot the trial interest rates, then interpolating.

For example, you want to buy a new batch mixer next January. Costs $1000. Savings (receipts less expenditures before depreciation and income taxes) in labor, material, etc., figured to be $400 per year under present costs. Useful life of the

How to Sell PI

Because PI is new, you'll have to sell it—show that PI is the best way to measure worth of a proposal.

To sell PI, here are your most persuasive points:

... Reliability. PI weighs all fixed and variable factors.

... Comparability. PI brings all investments down to a consistent yardstick. Most rule-of-thumb accounting analyses today are pretty loose. For example, take that batch mixer (see text). Investment, $1000; annual savings, $400; tax, 50%. Put those constants, with two variables, through five of the accepted ways of figuring profitability after taxes:

1. Average annual return on investment, no repayment of investment. With 5-year equipment life, predicted income is 30% with straight-line and sum-of-digits depreciation. With 10-year life, straight-line depreciation, income falls to 25%.

2. Same as above, with repayment of investment. With 5-year life and straight-line or sum-of-digits depreciation, profitability is 10%. But with 10-year life and straight-line depreciation, profitability rises to 15%. That's inconsistent with Method 1. Trouble is, Methods 1 and 2 ignore depreciation methods, show oppposite effects when life is extended.

3. Average return on average investment. With 5-year life, income is 16.7% on straight-line basis, 21.5% on sum-of-digits. With 10-year life and straight-line depreciation, it's 50%. That's unreliable because, once the investment is fully depreciated, useful life becomes the strongest factor.

4. Annual return based on book value. With 5-year life and straight-line depreciation, profitability is 10% in the first year, 50% in the fifth, then 0%. With 5-year life and sum-of-digits, it's 3.3% in the first year, 250% in the fifth, 0% in the sixth. But with 10-year life and straight-line depreciation, profitability is infinity after 5 years. That's meaningless. But it's the nature of the method because as book value declines, return on book value gets larger.

5. Payout, expressed in years to repay investment. With straight-line depreciation, payout comes after 3.3 years; with sum-of-digits, 3 years. Sure, payout tells how long to get your money back. But it's not concerned with productive life—a serious shortcoming when you're looking for true worth.

mixer, 5 years—at the end of which time you will scrap it at no value, fully depreciated (assuming your accounting department and the U. S. Treasury's Bulletin F back you up). Federal income taxes to take 50% of net profit. *Your question:* What's the true worth—or rate of return—of this investment? In other words, what compound interest will it pay?

Step 1—Compute net profit (receipts less expenditures after income taxes but before depreciation). Do it this way:

	1	2	3	4	5
Year	Savings	Depreciation Tax Deduction (20% Straight-Line Method)	Net Taxable Income	50% Income Tax	Net Profit
1956	$400	$200	$200	$100	$300
1957	400	200	200	100	300
1958	400	200	200	100	300
1959	400	200	200	100	300
1960	400	200	200	100	300

Net taxable income for each of the 5 years (column 3 above) is derived by subtracting depreciation from estimated savings. For PI purposes, consider savings to be the same as profit added. (That's how the investor looks at it.) The 50% tax rate puts a $100 bite on the $200 net taxable income. Thus net profit becomes $300 for each successive year. Enter net profit for each year of the life of the batch mixer (column 5 above) on the worksheet (see page 92).

Step 2—Continue with the worksheet. In column 1 at "zero time" enter the $1000 to be spent for the batch mixer. If you've already made some preliminary investment (a footing, for instance) before "zero time," enter the cost of it in the space just above. And if you expect to invest more in the equipment during the first year after "zero time," enter that amount in the space just below.

Step 3—Still on the worksheet. In column 1, find totals for disbursements ($1000) and net profit ($1500). Calculate the ratio of net profit to disbursements. Ratio is 1:5.

Step 4—Repeat steps 2 and 3 for disbursements and net profit in columns 2, 3, 4, and 5 of the worksheet, multiplying the figures in column 1 by the discount factor for each year. (The discount factor is determined by the trial interest rate at the head of each column.) This gives "present value." In each column get totals for disbursements and net profits, then find the ratios.

Step 5—Now go to the graph (page 92). Plot the ratios against the trial interest (or discount) rates. Connect the points with a smooth curve. Where the curve intersects the heavy 1.0 ratio line, read across horizontally to the PI. For your batch mixer, it's 17.5% compound interest. That's the true rate of return on the investment. You can now take that figure to the finance committee and say: "If our estimates of expenditures and savings are correct, then this project is worth as much to the company as if the $1000 were invested at 17½% compound interest for five years." Better still, the figure gives top management a constant, reliable yardstick for measuring your proposal against another.

What the figures mean — The $285 on the first line of column 2 on the inflow part of the worksheet is the theoretical amount of money you'd have to invest at 10% compound interest at the start of 1956 to pay the $300 net profit you expect at the end of the first year. Same for the $258 on the second line—it's the amount you'd have to invest at 10% compound interest to get the $300 you expect during the second year. Totals of the discounted figures in column 2 show that it would take $1180 invested at 10% compound interest at the start of 1956 to meet the required $300 payments for each of the 5 upcoming years.

Same for column 3 of the worksheet. It shows that, if 15% interest were available, only $1056 would have to be invested; if 25%, only $856. And so on.

Now what you really want to know is the interest rate at which $1000 invested now in a batch mixer will provide sufficient funds to pay out your $300 per year for 5 years, as specified in your estimate of net profit. This is the interest rate at which there is a ratio of 1.0 (equality) between total of present value of expenditures and total of present value of future net profit. Because the relationship of interest rate to ratio is not linear, the graph eliminates complex computations and permits quick and accurate interpolation. The five trial interest rates (including 0%) for which the calculations were made will span almost all investments.

For plant men with a taste for math, the discounting and compounding factors on the worksheet are based on continuous compounding—that is, on the assumption that money comes in uniformly during the year and is compounded continuously. The factors are taken from tables printed by J. C. Gregory, Atlantic Refining Company. This way of figuring tends to make the calculated interest rates slightly conservative. Gregory's tables are set up on 1-year intervals. Other tables are on 5-year intervals.

CAUTIONS

PI provides a standard broadgage measure—better than any other known device—for comparing the economic worth of investments. But you should be careful how you use it.

Consider all factors—The sample calculations above use net profit after taxes. You can also compute PI, using net profit before taxes. But if you do this you'll overlook the great effects of taxes, depreciation allowances, and the various ways of calculating depreciation.

Use business judgment—PI is a big, new tool in management's economic kit. But it's not a substitute for business judgment.

First of all, considerable judgment must shape the preliminary estimates that are fed into the calculations—probable amount to be invested, amount and schedule of savings, selection and application of tax and depreciation rates.

Even after you've got your PI, you'll have to submit it to rigorous evaluation. It doesn't tell you, for instance, whether the index is high enough to warrant the risk of the

proposed investment. Nor does it tell you that investments with identical PI's are equally desirable. (For example, an investment in a power plant, which is a rather stable operation, is much less risky than an investment in a specialty manufacturing line that might be changed or abandoned within a short time.)

Finally, factors outside the PI calculations must be pulled into decision-making. Because PI is based on the principle that money in the hand today is worth more than the same amount in the bush some years from now, the length of time in which a project will return its investment is significant. Other factors that call for mature judgment are the company's cash position and its contracted indebtedness. And though PI shows the true long-term picture on profits, judgment and skill still are needed to sell stockholders on a long-term investment (with the possibility of no dividends for a while) compared with an investment that will show quick profits.

Don't press PI too far—Take profit maintaining, for instance. If present profit levels won't hold up unless you make a proposed investment, you've got a decision to make. PI is not always serviceable here. For example, take the replacement of one broken machine in a battery of six connected machines that can't operate unless all are operable. If you evaluate these machines one by one, claiming the net profit of the whole group to be at stake, your PI justifications may look good—but they'll be based on a false premise and will probably lead you to false conclusions.

For the six machines, you can evaluate the desirability of replacement by estimating the remaining life of the project in which the machines are required together, together with amount and timing of anticipated incomes and investment requirements. That will give you a PI. Then you can weigh prospects indicated by the PI against the alternative of doing nothing—abandoning the whole project. The future effect of past investments in this project should be limited to salvage value and to the impact on income taxes of the various ways of handling the book values that remain. The past investment itself is irretrievably lost and is not relevant to current evaluations.

PI will work lots of ways for you

It's flexible. And gives you figures you can compare.

Different depreciation methods—The sample calculation on p. 94 was worked out for straight-line depreciation. PI works just as well for calculating sum-of-the-digits depreciation. Like this:

Year	Savings	Depreciation (sum-of-digits method)	Net Taxable Income	50% Income Tax	Net Profit
1956	$400	$333	$ 66	$ 33	$367
1957	400	267	132	66	334
1958	400	200	200	100	300
1959	400	133	267	134	266
1960	400	67	332	167	233

Insert these net profit figures year by year on the worksheet, compute present values, work out ratios, and plot them. You get a PI of 20%.

Productive-life stretchout—If you can extend productive life of equipment from 5 to 10 years, even by the straight-line depreciation method, PI increases to 26%. But if productive life stays at 5 years, and allowable depreciation is only 10% by the straight-line method, PI drops to 13½%.

Buy or lease?—Suppose you're satisfied with a PI of 20% for your batch mixer, as in the sample calculation shown earlier. Then you get a proposal that will provide the necessary equipment on lease. Should you lease? Or purchase? Here's how PI looks at it:

Lease differs from purchase only in capital cost, income tax deductions for description, and annual expense of the lease. You could calculate the PI of the lease and compare it with the PI of the purchase. Or you could find the PI of the differences between what goes out and what comes in, as below:

	Year	1 Capital Cost	2 Depreciation Tax-Deduction (20% sum-of-digits method)	3 Annual Expense
Lease	1			$331
	2			308
	3			237
	4			219
	5			105
Purchase	1	$1000	$333	
	2		267	
	3		200	
	4		133	
	5		67	
Difference	1	$1000	$333	$331
	2		267	308
	3		200	237
	4		133	219
	5		67	105

Look at the "Difference" bracket. Column 2 tells you what you get by purchase (that is, depreciation); column 3, what you don't have to pay (that is, rent for equipment) if you purchase. In other words, purchase will increase your profits by eliminating rental costs and by giving you income tax deductions for depreciation.

Now compute net profit difference for each year:

Year	Savings (money you don't spend)	Depreciation Tax Deduction (20% sum-of-digits method)	Net Taxable Income	50% Income Tax	Net Profit
1	$331	$333	$ 0	$ 0	$331
2	308	267	41	21	287
3	237	200	37	19	218
4	219	133	86	43	176
5	105	67	38	19	86

Turn the page

Using net profit figures above, go to the worksheet, derive present values, work out totals and ratios, plot ratios, interpolate for the PI of the difference. It's 6½%. Thus you know that, out of the 20% PI you originally figured for your batch mixer, 6½% comes from the fact that you'll own it rather than lease it. The remaining 13½% comes from savings inherent in the new batch mixer, whether bought or leased.

Cheap or costly?—Say you're still wrestling with a mixing problem. Should you buy expensive, long-lasting equipment or cheap, short-lived equipment? You can find the answer by evaluating one alternative against the other, calculating PI on the difference. Like this:

	Costly Equipment	Cheap Equipment
Cost	$1000	$500
Straight-line depreciation	5% per year	20% per year
Productive life	15 years	5 years
Annual repairs	$100	$200

Establish the difference between the alternatives. Additional capital for the costly item is $500 invested at the start of the first year. After that, record the differences in receipts and disbursements as they affect net profit each year, as in the table below:

	Added Profit by Purchase of $1000 Unit		Income Tax Deductions for Depreciation		
Year	Savings Repairs	Savings on Replacement	Purchase of $1000 Item	Non-Purchase of $500 Items	Net Profit After 50% Income Tax
1	$100		$50	–$100	$ 25
2	100		50	–100	25
3	100		50	–100	25
4	100		50	–100	25
5	100		50	–100	25
6	100	$500	50	–100	525
7	100		50	–100	25
8	100		50	–100	25
9	100		50	–100	25
10	100		50	–100	25
11	100	500	50	–100	525
12	100		50	–100	25
13	100		50	–100	25
14	100		50	–100	25
15	100		50	–100	150

Using the figures above, the PI is calculated to be approximately 14½%. This means that by buying the more expensive batch mixer you will receive a return on the extra $500 equivalent to investing it at 14½% interest compounded. One more question for your business judgment: Are there any other projects at hand in which $500 could be invested for a higher return or a smaller risk? You'll have to answer that one yourself. PI can only give you the facts.

To act or not to act—Though it's not always clear on the face of a proposal, all management decisions involve a choice between two or more courses. The hidden alternative may be to do nothing—in which event, PI is 0. And your company sometimes may choose just that if the PI of your proposal isn't attractive enough. On the other hand, in emergencies where inaction would mean disaster (Hurricane Connie, for instance), your company may take on a new project regardless of PI. The point is, PI can't be the sole guide in every situation.

REPRINTS OF THIS ARTICLE are available on request to The Editor, FACTORY, 330 West 42nd St., New York 36. Price: up to 100 copies, 35¢ each. Special prices on lots over 100.

WHAT ABOUT MAPI?

Even if you're now using the widely publicized MAPI (Machinery & Allied Products Institute) formula, you may still find PI helpful as a supplement and check. Fact is, MAPI and PI are similar. Both are sound, systematic ways to evaluate replacements and investments.

MAPI is a variation of the average annual cost method—a way of comparing alternatives. Basically it reduces (through discounting) all costs to an equivalent annual cost, pits the proposed replacement (the challenger) against the current facility (the defender), shows the alternative with the lowest average annual cost. MAPI computations consider (1) "out of pocket" yearly operating loss through failure to replace current equipment with the more efficient facility and (2) loss in salvage value and interest by forgoing the opportunity to sell the existing facility now for cash.

In making MAPI calculations, you have to use judgment in selecting the trial interest rate. This is important because the comparative desirability of the various investments varies widely with the rates you select.

HOW ONE COMPANY USES PI

Since the fall of 1954 the Chemical Divisions of Food Machinery & Chemical Corporation have used a variation of PI calculations to evaluate major investments. Nearly all appropriations over $20,000 requested on the basis of added profit are measured by PI before going up to top management. Many of the company's managers are using it for smaller investments, too.

In general, PI is used to evaluate investment expenditures in two classes:

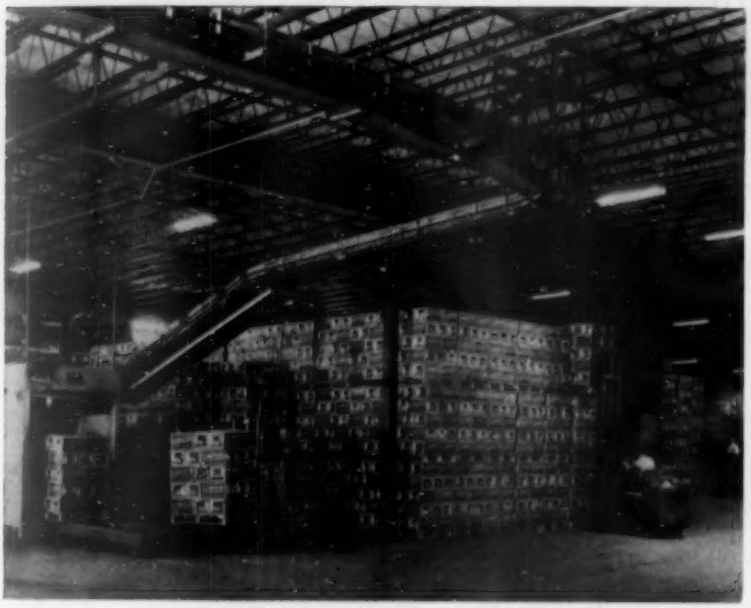
. . . *Class I.* Those that add profit by increasing sales revenues — new products, higher volume of present products, or increased prices of current products through better quality.

. . . *Class II.* Those that add profit through cost reduction or savings.

For both classes, PI is the prime yardstick. But not the only factor in decision-making. For Class I investments, the company considers PI plus per cent return on sales, break-even points, and payout after taxes; for Class II investments, PI plus payout after taxes.

Want to Cut Truck-Loading Time?

New quick-in, quick-out system will cut anybody's costs. Doesn't matter whether you're loading beer (as Falstaff is here), bearings, or balsa wood.



PALLET LOADER automatically palletizes cases for storage, or for loading on outgoing trucks. Four-line conveyor system connects warehouse with bottle shop.

DELIVERY TRUCK is unloaded, loaded—and out again—in 7 minutes. Above, two fork-lift trucks load the palletized cases on an outgoing truck.

SEVEN MINUTES! That's all the time it takes for warehousemen at Falstaff Brewing Corporation (St. Louis) to remove empty cases from a truck, load it up again, and send it on its way. Before the brewery had the new warehouse (and new handling system) shown here, the job took between 20 and 25 minutes. Result, say Falstaff executives —savings amounting to thousands of overtime man-hours—and dollars.

Conveyors and pallet loader—These get part of the credit. A four-line case-conveyor system connects the warehouse with the brewery's bottle shop some 60 feet away. Two of the conveyors serve incoming vehicles, return empty cases to the bottle shop. The other two (see upper photo) bring full cases from the bottle shop to automatic pallet loaders (far left) on either side of the warehouse. Palletized cases are stacked by fork-lift trucks, ready to be loaded into delivery trucks.

Drive-through loading—An approaching delivery truck (Falstaff has 70 in its city-delivery fleet—all must be loaded daily) actuates the entrance-door mechanism automatically. After the truck enters the building and the driver checks in, empty cases are removed from the truck (lower photo; right background), placed on the empty-case conveyor. The truck is then driven on to the loading area (foreground), where fork trucks load it with previously palletized cases. The truck then continues its drive through the warehouse, exits by another electronically controlled door, ready to make its deliveries. This straight-through path, of course, eliminates any lost time in truck maneuvering, interference at docks.

Any loading and unloading for inter-plant truck handling is done at separate truck wells in another part of the warehouse, does not interfere with operations described above. These wells have platforms that are hydraulically raised or lowered to truck bed height making use of fork trucks easy, efficient.

IN PRODUCTION—electronic analyzer measures vibration in spindle of vertical grinder. Check is made every time grinding wheel is changed, or new job is set up. This way, Timken makes precision bearing parts within 0.0002-in. tolerance.

Sure Cure for Machine Jitters

Vibration spotter is just what the doctor ordered for Timken's precision machines—and very possibly for yours. Locates jiggling, cuts waste and maintenance.

CLOSE TOLERANCES a "must" in your product? If so, machines that vibrate can cost you money. Pile up rejects. Send your maintenance bills soaring—because the constant pounding of unbalanced forces wears out machine parts, makes frequent repairs necessary.

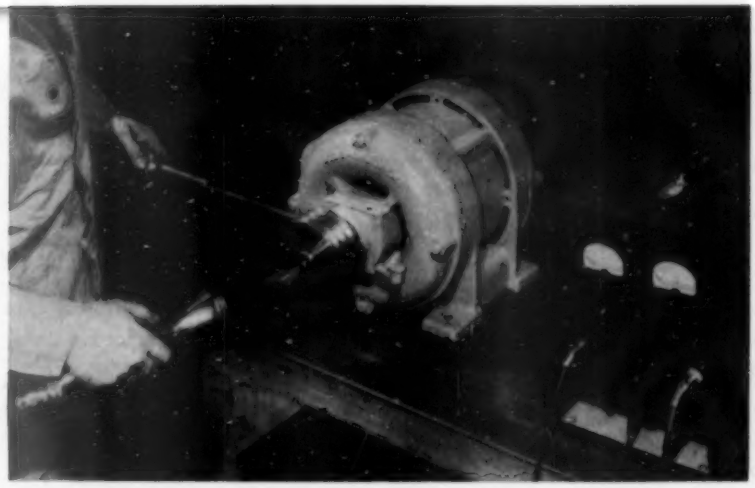
Nobody knows this better than The Timken Roller Bearing Company. Some of the tapered bearings it makes must be accurate within 75-millionths of an inch. Which is why Timken is now using vibration spotters. The company has three new electronic analyzers in service at Canton, other units in Timken plants elsewhere. With them, maintenance men track down vibration wherever it exists in rotary equipment—service as well as production facilities. Results:

. . . Higher quality in products.

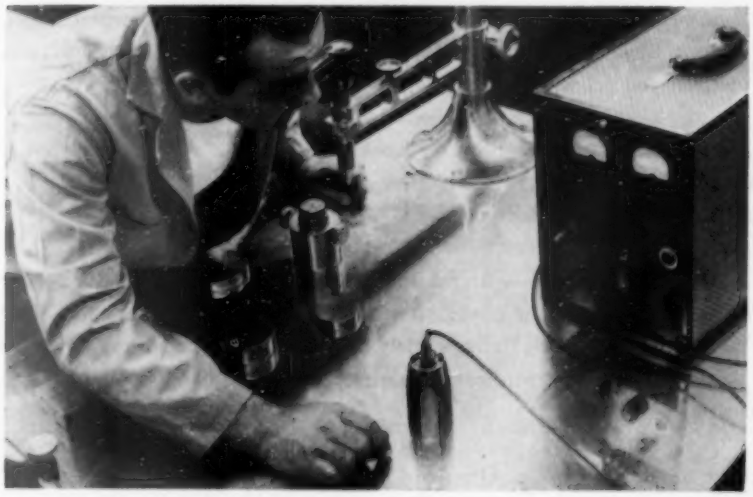
. . . Less scrap, fewer rejects. Example: Bearing-cup scrap on thread grinders cut from 9% to 3%.

. . . Faster diagnosis of troubles, quicker spotting of vibration sources.

. . . Less downtime spent in balancing machine parts. Formerly



IN MAINTENANCE—instrument measures shakes in this complete motor-sheave assembly, just back from repair shop. Armature already has been balanced on a balancing machine. All-new rotary equipment is checked this way after first run-in.



IN TOOL INSPECTION—analyzer gives a regular check-up to this 2-ton surface plate. Plate is accurate to 0.000075 inch. This is how Timken makes double-sure there's no vibration to throw tool-gage settings and measurements out of kilter.

maintenance men removed grinding wheels from grinders, balanced them on a static balancer, re-installed them. Took 3 hours. And still a wheel could be out of balance. Today they balance a wheel right on the spindle at normal running speed. Takes as little as 40 minutes—sometimes even less. And the mounted wheel is in perfect balance.

. . . Longer life for bearings and machines. No detailed figures are available. But Timken knows the gains are real.

Test for jitters — Maintenance men carry a portable electronic instrument to the job. It's a Model 652 IRD Vibration Analyzer, made by International Research & Development Corporation, Columbus. It weighs about 34 pounds. Costs around $2200, including accessories: a vibration pick-up with a filtering probe; a stroboscopic lamp. Two direct-reading dials on instrument show frequency and amplitude of vibrations.

Here's what an inspector does: Shuts down machine. Puts pick-up or probe on spindle or housing. Gets readings that tell how much vibration comes from outside the machine, thus learns what minimum vibration will be even if machine is balanced perfectly.

Next he spots the source of vibration within the machine itself. He holds the pick-up on the spindle or housing. Starts up each part of machine in turn. Takes a reading when each part is running. Readings of high amplitude put the finger on the trouble-making part. Inspector notes vibration-frequency reading at speed (rpm.) at which part shows excessive vibration. Then points strobe at faulty part. Vibrations picked up by the probe trigger the strobe in synchronization with vibrations of the guilty part. Inspector makes reference mark on part, then begins adding balancing weights. He watches angular shift of reference mark as strobe plays on it, knows when balance improves. Keeps on balancing until he achieves the low amplitude he wants.

Check each shift—Timken uses vibration analyzers mostly on precision grinders — thread grinders, centerless grinders, many others. There are two scheduled "musts": Wheel balance must be checked at least once every shift. That's because it changes with wheel wear. And centerless grinders must be checked whenever new wheels are installed. Sometimes extra interchangeable wheels are balanced on the spindle, then stored in nearby racks for later use.

And that's not all. The analyzers are used also to check vibration in any of the 2900-odd machines in the plant—whenever vibration is suspected. That includes turret lathes, engine lathes, screw machines, milling machines, planers, shapers, new and rebuilt motors for grinders, belts, chains, pulleys, sprockets, wheel spindles, rotors, fans, pumps, and so on.

The analyzer even develops data for plant-floor vibration charts—shows horizontal north-south and east-west as well as vertical vibrations. These charts help choose spots for precision machines.

Big advantage—The vibration analyzer does its job right at the machine. And while the machine is running. No need to pull the machine apart to find out what's giving it the jitters.

And the analyzer is easy to use. Ray Streby, master mechanic, says a machine repair man can learn how in a day. But he'll need practice to interpret what the instrument shows. At Timken, six men (three per shift) use two analyzers in mechanical maintenance. And four men (two per shift) use a third unit in the tool division.

FACTORY | IDEAS OF THE MONTH

By LEWIS K. URQUHART, Managing Editor, FACTORY

With Perspectograph a draftsman can quickly and easily translate an orthographic drawing (top and side views of same object) into a perspective drawing. Sells for $275. Perspectograph Corp., 285 Madison Ave., New York 17.

Booklet of the month is called "The man who paid $4 for a 68¢ light bulb," by Westinghouse. Tells you how group replacement works—in highly non-technical language that entertains while it convinces.

Dimetcote goes on with either brush or spray. But it ain't paint. It's a 100% metallic zinc coating that contains no oils or resins. The maker (Amercoat Corp., 4809 Firestone Blvd., South Gate, Calif.) says it'll give existing steel structures same protection you get with galvanizing.

Repel papers, just announced by Thilmany Pulp & Paper Co. (Kaukauna, Wis.), exhibit extremely high resistance to penetration by a wide variety of oils and greases. Ask Thilco for a demonstrating kit—and see for yourself.

Speaking of paper— Riegel Paper Corp. (260 Madison Ave., New York 16) has an amazing new paper. It resists passage of oil, water, and other liquids, but permits air to pass through freely. The Riegel folks want to know who needs a paper with these extraordinary qualities. And they'd like to talk to anyone with ideas on the subject.

Zip-Spray is a quick-drying lacquer developed by Zip Abrasive Co. (1360 W. 9th St., Cleveland 13) especially for identifying metal bars and other forms. Comes in 12 colors. $1.35 per can.

Polybilt plastic tanks are probably the newest thing in storage drums. A 500-gal. job weighs only 168 lb., costs only 76¢ per gal. They're built up from glass-reinforced polyester sections. Copolynur Corp., 3716 W. Jefferson Blvd., Los Angeles 16.

Nail-a-Matic is the niftiest nail driver we've seen. Automatic feed. For millwork, crating, furniture manufacturing, etc. Weighs only 5 lb. Will drive 50 8-penny nails a minute. Matrix Eng. Corp., 3016 E. Lake St., Minneapolis.

Hot dawg! Newest wending machine cooks and delivers a frankfurter, with roll and mustard, in 20 seconds. Nu-Matic Machines, 250 W. 57th St., New York 19.

Magnesium fires. You probably read about the barrels that got loose during the flood that hit Connecticut in August! And maybe you'd like the low-down on this lightest and most machinable of structural metals. If so, ask The Magnesium Assn. (122 E. 42nd St., New York 17) for one of its 9x12 cards—and tack it up near grinding and machining equipment.

A seat belt in every company car—and in your own car, too. Eventually, why not now? Newest convert to this safety practice is U. S. Steel's Consolidated Western Steel Division.

Napco loader is a new bulk handler with 7½-ft. lift under bucket. Capacity, 15 cu. ft. Napco Industries, Inc., 834 N. Seventh St., Minneapolis.

15 Stoppers at Machine Tool and Production Engineering Shows . . .

- **4-WAY MILLING**—horizontal, vertical, angular, universal—on the "Quartet." The U. S. Burke Machine Tool Div., Brotherton Road, Cincinnati 27.
- **PROBOGRAPH**—a high-precision automatic measuring machine that records in graph form. The Warner Swasey Research Corp., 24 W. 33rd St., New York 1.
- **DRILL-PRESS FEED,** air-hydraulic, that automatically feeds and retracts drill. Maintains uniform speed. Mead Specialties Co., 4114 N. Knox Ave., Chicago 41.
- **AUTOMATIC SCREW MACHINE** that assembles, too. Watched it machine steel part and assemble brass part to it in 18 seconds! Brown & Sharpe, Providence.
- **SOCKET SET SCREWS,** with holes all the way through, for automatic feeding and assembly. The Bristol Co., Socket Screw Div., Waterbury 20, Conn.
- **ELEKTROJET** — the precision cutting process that erodes metals by electric spark. The Cincinnati Milling Machine Co., Cincinnati 9.
- **PORTOMAG**—a portable drill with a magnet to hold it in place for drilling, and tapping operations. Portomag Sales, Inc., Box 54, Ferndale 20, Mich.
- **DEVCON**—the "plastic steel" for dies, fixtures, and repairs. It's 80% steel, 20% plastic. Pour it into a mold, let it harden, and it's ready to use. Chemical Development Corp., 227 Endicott St., Danvers, Mass.
- **ROCKWELL HARDNESS TESTER,** automatic, capable of making 100 to 1200 tests per hour. American Chain & Cable Co., 929 Connecticut Ave., Bridgeport.
- **MAGNETIC AIR VALVE** with two units—one an operating unit, the other a standby unit for safety's sake. Clark Controller Co., 1146 E. 152 St., Cleveland.
- **PROGRAMERS**—most exciting of all new developments. Saw five: G-E's Numerical Positioning Control *(Specialty Control Dept., Waynesboro, Va.)*, Multiple Channel Programer *(Hillyer Instrument Co., 54 Lafayette St., New York 13)*, Binotrol *(Barnes Engineering Co., 30 Commerce Road, Stamford, Conn.)*, Numericord *(Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.)*, Numerical Control *(Pratt & Whitney, W. Hartford 1, Conn.)*

No Change Too Small

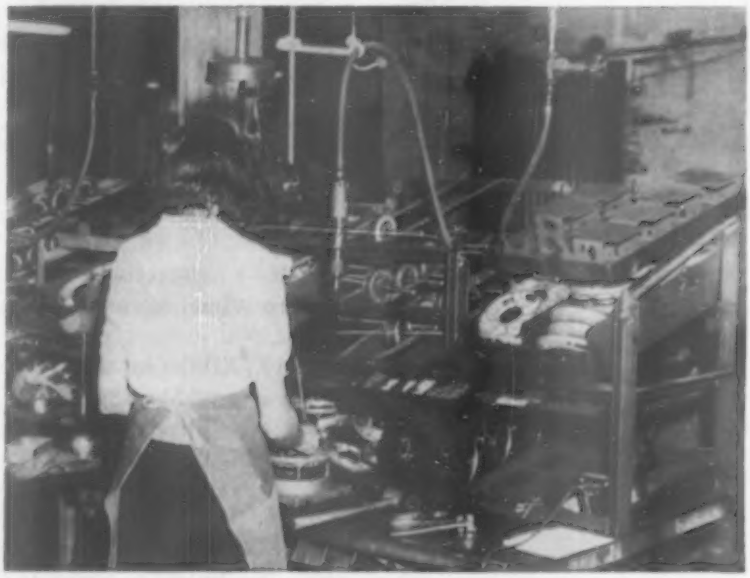
Big changes—little ones. They all count. That's the philosophy at Century Electric Company (St. Louis). There better methods are not only increasing productivity. They're also shortening manufacturing intervals, reducing fatigue, minimizing damage and spoilage during handling and storage.

One Man Keeps Eight Assemblers Supplied

Chutes on a slant enable one service man to keep eight motor assemblers supplied with component parts. He loads chutes from the rear. No need for assemblers to leave their posts for parts or power tools.

Each operator does a complete job of assembling these fractional horsepower motors (for air conditioners and window fans). That's because the operation can't be broken down into elements for progressive assembly. Combination of service man and chute streamlines the job.

Benefits—It's fast and easy to change from one motor model to another. And no bottlenecks.



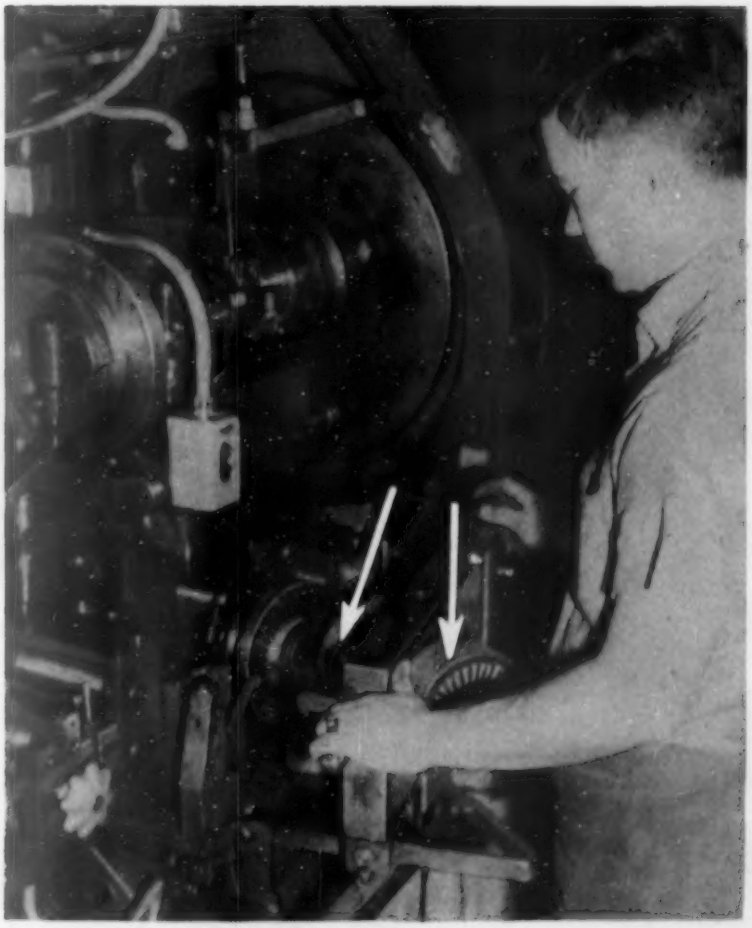
Conveyorized Table Halves Labor Cost

It speeds motor assembly. Lightweight cast aluminum dollies carry individual assemblies as they move at waist level around rectangular assembly line. Motor-driven belt conveyors carry dollies along two parallel sides of rectangle while roller conveyors are used on the other two parallel sides. Variable-speed overhead conveyor (arrow) feeds components to six operators of balanced assembly line.

Dollies also act as a holding fixture. They let operators work on the motors in a vertical rather than horizontal position, thus make assembly easier. Overhead power tools facilitate the job.

Old method—Operators assembled motors in horizontal position on straight-line roller conveyor.

Benefits—Direct labor saving of over 50%.



New Loader Keeps Machine Hopping

It feeds motor stators quickly and easily into a machine that automatically places insulation into stator slots. (The machine cuffs, forms, cuts, and inserts insulation from roll stock.) The loading fixture is a double-sided gate, can hold one stator on each side (arrows).

Here's how it works: While one stator is being loaded with insulating materials in the machine, the operator places an uninsulated stator on the reverse side of the mandrel. When the part in the machine is done, the operator pulls out the loading gate. Inertia swings the mandrel around 180 degrees. This puts the finished part on the outside for unloading, the unfinished part on the machine side. Thus, when the operator pushes the gate back in, it positions the uninsulated stator in the machine, ready to receive insulation.

Old method — Insulation was hand-loaded in the stators.

Benefits—With the loading gate making speedy changes possible, the operator can keep the machine working 97% of the time. The machine-loading method yields an 85% saving over the hand method.

New Holder Saves $2100 First Year

This, coupled with a multi-section parts tray, boosts production rate on motor switch assembly. Operation involves positioning screws in holding jig (number depends on motor type), placing switch body over them, then securing body with washers and nuts. Operator uses a power tool to tighten nuts. Multi-section tray provides for right- and left-hand feeding.

Old method—Hand operation, no planned work area, no power tool.

Benefits—Saving on labor alone came to over $2100 the first year. This improvement won second place in the Ralph H. Landes Methods Improvement contest for 1954, sponsored by the Industrial Management Society.

Turn the page

Continuous Brazing Cuts Cost 65%

It provides faster, better connecnection of rotor bars and rotor end ring of large integral motors.

The operator positions the two sections on a variable-speed revolving platform fixture. The jets (26 of them) around the platform provide the heat. With the two components in place and the jets partly turned up, the operator starts the platform moving.

As the platform revolves, the brazing area is preheated. At the same time the operator places brazing slugs between the rotor bars (see photo above). When this is completed, the jets are turned up full blast for 2 to 6 minutes, providing heat at 1450 to 1500 F. to make the joint. During brazing, the operator keeps a constant check on the process.

Old method—Used flux, rod, and lower heat. The part was rotated by hand. And the operation was considerably slower.

Benefits—A 65% labor saving. Plus better joints, both electrically and mechanically.

Better Way to Ship

These cut packing costs on quantity shipments of fractional horsepower motors. Each carton attached to wooden pallet holds from 80 to 100 motors in layers of 15 to 20 each. Cardboard sectional and layer dividers placed in cartons by the packer prevent units from damaging each other during shipment. No other packaging material is needed.

Old method—Each motor was individually packed in its own carton.

Benefits — Savings to Century amount to as much as 60%. Also, customers save by easier handling and unpacking.

Special Truck for Safer Handling

They make handling and transporting of round motor stators easier. Constructed entirely of angle iron, each truck has four (see photo, left) or five decks that can carry five rows of stators each. Truck capacity varies, of course, with the size of stators carried.

The bottom deck is fixed. It helps brace the truck's corner supports. Other decks are hinged at one end. This way, they can be placed in an out-of-the-way vertical position when not in use. They are rotated 90 degrees into a horizontal position for loading. For easy movement, each truck has two fixed and two swivel casters. The truck also provides in-process storage racks for stators between operations.

Old method—Wood pallets with boards between layers.

Benefits—Stator damage reduced 75% during storage. Easier transporting and handling. No need for a lift truck to move loads around the shop.

FROM SALES TO PRODUCTION. Wayne Harrold (right) made his bid for executive development after 13 years in sales-office jobs. He's been on the rotation merry-go-round ever since.

. . . TO PROCESS ENGINEERING. Wayne moved into job routing for three months. Talks like above with Ed Golko, tool engineer, helped him understand design and layout problems.

. . . TO STANDARDS. Wayne spent over eight months here. Work with clock and clipboard gave him the background he needed in the technical side of production supervision.

. . . TO PURCHASING. Two months as purchasing agent taught Wayne the buying side of the plant executive's job. Here he gets the sales pitch from a supplier's representative.

Now He Knows the Other Guy's Job

Job rotation (see photos) is building professional managers for future top spots, says Parker Appliance—and cites immediate dollar payoff to boot.

EVER MEET a production manager who used to be in accounting? A line foreman who once sat at a desk in sales? We've got them in Parker Appliance's Industrial Hydraulics Division.

Why? Because we rotate our supervisors. It's a little like musical chairs. But our rotation, unlike the game you used to play when you were a child, leaves no one without a seat.

Goal — To develop professional managers — men with an over-all grasp of company problems. Supervisors with these qualities do their jobs better. They're likely candidates for top spots in management.

How do we do this? By putting men in jobs that capitalize on their strong points—and plug the holes in their experience.

By CARL J. GIBLIN, Manager
Industrial Hydraulics Division
Parker Appliance Company
Cleveland

PAYOFF TEST comes when Wayne is made foreman of the fuel-selector valve department. Here, he's working at that job. If he succeeds in supervising men, he's on his way up the ladder. Wayne followed no rigid schedule in rotation, moved from job to job as openings became available. He entered the program at his own request, is one of the 10 men selected.

Benefits — Supervisory rotation meets three needs:

. . . *Trains management commandos.* We get flexible thinkers who can adjust fast to unfamiliar problems, can cope with new products and processes.

. . . *Improves understanding.* If you've held the other guy's job, you're a lot more sympathetic with his problems. Since our supervisors have been rotating, we haven't heard much of that old tune about why so-and-so does such-and-such all the time. Now they know why.

. . . *Holds our good men.* And attracts other good men.

Dollar pay-off—Not easy to pinpoint in a program like this. It's more a matter of how the program affects your plant climate. But these things have happened since we started our rotation program three years ago:

. . . *Orders are filled faster.* Our monthly percentage of unfinished production has dropped from 25% to 5%—in spite of quicker delivery promises.

. . . *Labor is more productive.* Dollar volume of shipments per man in the shop has jumped from $1000 to $2200 a month.

. . . *Paperwork has been pared.* On-schedule shipments have reduced the number of clerks required in our customer follow-up department from six to two.

. . . *Union relations are smoother.* There hasn't been a labor grievance in more than a year. We used to have about 10 a year.

Big-plant stuff? No—judging from our experience. In Parker's decentralized organization (FACTORY, February 1953, page 104), each division operates like a small independent plant. Idea is to give a fairly large company small-company flexibility.

Our Industrial Hydraulics Division has 170 employees and an annual sales volume of $3½-million. Carrying the company philosophy a step further, we run several of our departments like small businesses. Each of these has most of the tools

and processes necessary to manufacture a finished product.

When a foreman switches from a department that's making aluminum valves for the Air Force to one that's making valves for industry, he faces a brand-new set of problems—different materials, different operations, different quality standards—and different people.

How rotation got rolling

We began with two men. Both had the ability to go places, but lacked training and experience. So we moved them out of their old slots, started them on a new tack. Gradually, others came into the program. We let rotation sell itself.

. . . *Supervisor's attitude?* At first, supervisors were suspicious. But they soon found we weren't jamming it down their throats.

. . . *The union's attitude?* No opposition. We met once with the shop steward to explain the plan. That did the trick.

. . . *Top management?* Goes along with us 100%.

. . . *People out in the shop?* No kicks. Sure, they test a green foreman—toss him questions they think he can't answer. If he doesn't know, he calls for the division superintendent or someone in process engineering. We expect calls to diminish as a man learns his job.

And we tell a new foreman: "Don't try to bluff your people. If they like you, they'll carry you. If they think you're a phony, they'll hang you higher than a kite."

Who's on rotation?

On rotation now are the production manager, chief process engineer, purchasing agent, six line foremen, one man in production planning. One exception: a department foreman—a specialist who, at 58, is no longer bucking to move ahead.

Three top-level men don't rotate: division superintendent; sales manager, who reports to the sales vice president; and chief engineer, who has not been considered because he has just started reporting to me.

Men on rotation have been with Parker an average of six years each. They range in age from 30 to 44. Two hold master's degrees. Two haven't carried their education past high school.

Experience? Two examples: our chief inspector has been production manager and purchasing agent, worked in standards, process engineering, production planning. And a production foreman entered rotation after 13 years in sales-department office jobs. Since then, he's been a job router in process engineering, a timestudy man in standards.

Sometimes men enter rotation from outside the division. (Our production manager was our chief accountant.) Sometimes right out of hourly jobs. (The man who plans production of hydraulic valves used to run an automatic machine. He's also been night foreman of the automatic machine department, night superintendent, and a router and estimator in process engineering.)

Our rotations are up, down, sideways. If a man switches to a lower-rated job, he goes into a pay freeze. His pay isn't cut, but it isn't boosted. If he goes sideways or up, he's eligible for salary raises on merit.

How pick a man for rotation?

We like to have the idea come from the man. It shows the restlessness, drive, initiative we require. Any turndowns? A couple.

We also keep our eyes peeled for office and engineering people who might have better futures as line-department foremen. If we think they've got what it takes, we offer them a crack at rotation.

Job-opportunity cards, which predate rotation, help us find rotation material. They're circulated twice a year to all salaried men. Each employee writes in any jobs he wants, states his qualifications.

Every candidate for rotation has a conference with me. Maybe his immediate boss is present. Maybe not. Depends on his wishes. But we always tell his boss the conference is to take place.

Before the supervisor walks into my office, I've got a pretty good line on him. Chances are, I've had personal contact with him, know his reputation, have read his job-opportunity cards. And I can check my opinions against results of four aptitude and psychological tests given to all new Parker employees.

The conference serves two ends: Enables us to find out if the man qualifies for rotation; if he does, helps him plan his own program. It's an important session—for him and for us. Takes time—maybe half a day. And demands absolute honesty—on my part and on his.

I start by asking him his long-range goal at Parker. (Most men say division manager or superintendent.) How fast does he expect to move? (If his timetable is too tight, I tell him so.)

Next we dig into his strong points and weaknesses. I encourage him to dig for himself because I must be candid with him, but don't want to appear critical. Once we've agreed on his strength and weakness, we decide on the jobs to round him out.

Perhaps he's a staff man who's never had to rub shoulders with the union at shop level. So I ask him, "How'd you like to run a production department?" Maybe he's a line foreman who's weak on detail work. So I suggest a hitch in process engineering or production planning.

Somewhere along the line I point out the price of rotation — work nights, go into a salary freeze if he's downgraded to gain experience. I advise him to discuss these drawbacks with his wife.

Next we mesh the supervisor's timetable with the division timetable —find a spot where he can enter rotation. Not always easy. For instance: We may have decided to start him in process engineering, then move him to standards. But I find that process engineering has no room for him now. So we settle for standards as the first stop. Meanwhile, we have to pick up somebody to fill his old job.

With a fairly firm timetable worked out, I call the supervisor in again and present it to him. If he's satisfied, the switch is on.

Six ways to make rotation go

We've formed no rotation pattern because no two men on rotation are alike. But we've found that these rules apply to most supervisors:

. . . *Don't let them go too fast.* They'll hang themselves with the union — and wind up outside the company. Any man seeking a division manager's job should have at least a five-year timetable.

. . . *Groom them for the tough jobs.* Not by having them observe the jobs, but by giving them easier assignments first. An example: An office worker enters rotation. Has a good head for details and organizing. But lacks the knack of selling himself. We think he could do with a spell of supervising a production department. But we don't toss him to the wolves right away. We ease him out there—via standards to learn industrial engineering, methods, and incentives; process engineering to learn routing. Why? Because we want him to lick the technical problems so he can give all his energies to the more important problem of human relations.

And when he finally takes on a line job, we'll see that it's one where the pressure is not too great—on the night shift, for instance. If he makes good there, we'll move him into a real pressure-cooker spot on the day side. Success there qualifies him for a top-echelon spot.

This is important: Once a man takes on a production department, he commits himself in the shop. If he fails as a shop foreman, he rules himself out as a production manager, say, or a division superintendent. But we don't fire him. He's allowed to settle into a useful spot somewhere in our organization.

. . . *Stress human relations.* Some supervisors are people-centered. Some are problem-centered. The people-centered man adapts himself better to rotation. He thinks primarily of the people who work for him —and with him—instead of in terms of technical details.

. . . *Give them a hand.* But don't do their jobs for them. When a man becomes a production foreman, he starts living under the superintendent's wing. The superintendent walks lock-step with him, steers him on such matters as union relations, pay problems, etc. But the man must stand on his own feet if he's to get the union and the people in the plant to accept him as a foreman. That usually takes a couple of years.

. . . *Encourage outside education.* Most of our supervisors supplement plant experience with courses at such places as Case Institute, Fenn College, local high schools. The company pays for these courses, but on one condition—that the men finish them. Examples: Our chief inspector is studying statistical quality control. A former office supervisor is taking a course in machining. An ex-foreman, being groomed for a staff job, has just registered for a course in hydraulic engineering.

. . . *Don't set rigid timetables.* Tell a man the minimum time he'll spend on a job. But point out that he may spend more time there—either because he needs it or because it happens there aren't any openings when he's ready to rotate.

Time on a job varies with the man and the job. Generally speaking, supervisors spend a maximum of a year on staff jobs, a minimum of two on line jobs. How come? Because most of our management material is strong on staff work, but lacks line experience.

Do all men rotate at once? No. Too many different men involved. Too many changes in our division operations. Our aim is to keep the program elastic.

We've never made a 360-deg. turn. And don't expect to. That might work in a static set-up—but not here. To start the chain, we may eliminate a job, give a foreman additional duties, or bring in someone from outside the division.

Here's a recent example: The chief inspector became purchasing agent. The purchasing agent became production manager. The production manager became manager of another division. The tool-crib foreman became chief inspector. The plating-department foreman took over the tool crib in addition to his other duties.

No real obstacles

Any problems?—A couple. But not serious.

Big bug is meshing the supervisor's timetable with the company's. A man thinks he's ready for a bigger job, but there aren't any openings. We try to stick to his timetable, but we have to run a business. We have problems, too, when a staff man steps into a line job. He probably gulps when it dawns on him that he has changed from finding things out to getting things done.

Some cross this bridge eagerly, but this is often the "man with a mission." Suddenly he finds himself in a position to run things as he thinks they should be run. If he isn't careful, he may get into hot water with the union.

Any confusion? — Sure. Confusion is inevitable in any job change. Maybe there's a little more than normal in our case. We realize that an inexperienced man always runs the risk of making mistakes. But that's a price we're willing to pay.

We try to minimize confusion by having our top-echelon people work closely with a new man. And the man rotating into a new job can always question his predecessor.

Any failures?—Two men. But they failed from our point of view, not theirs. They used rotation as a stepping stone to jobs outside the company. These situations point up the need for honesty in the pre-rotation conference. If outside jobs were their goal, we think both men should have said so.

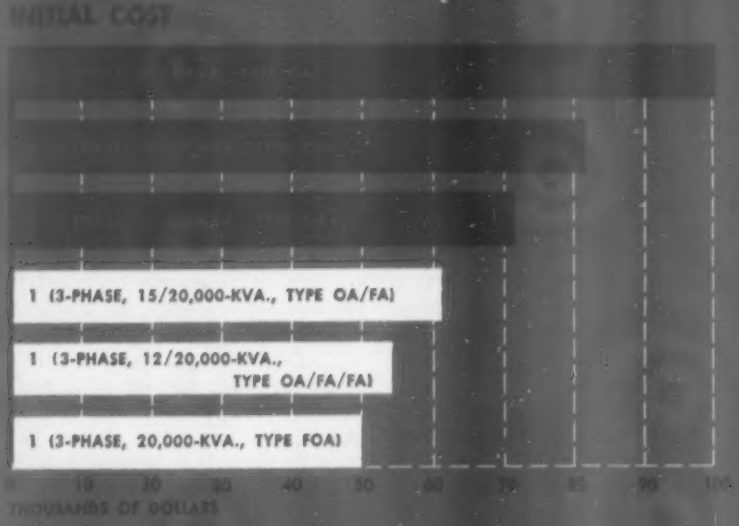
So far, we've nipped personal failures in the bud. If a man has ability but turns out to be a dud, it's our fault—not his. So we talk it over with him, show him where he's off the beam, suggest ways he can get back on.

Maybe he's a problem-centered man, can't sell himself, tells off his associates. We get complaints. He's fine at the mechanics of his job. But if other people aren't sold on him, he's a failure as a manager. So we suggest that he mix with the people who criticize him—go to lunch with them, even invite them to his home. Complaints cease. He's back on the beam. And he's learned a lesson that will help him.

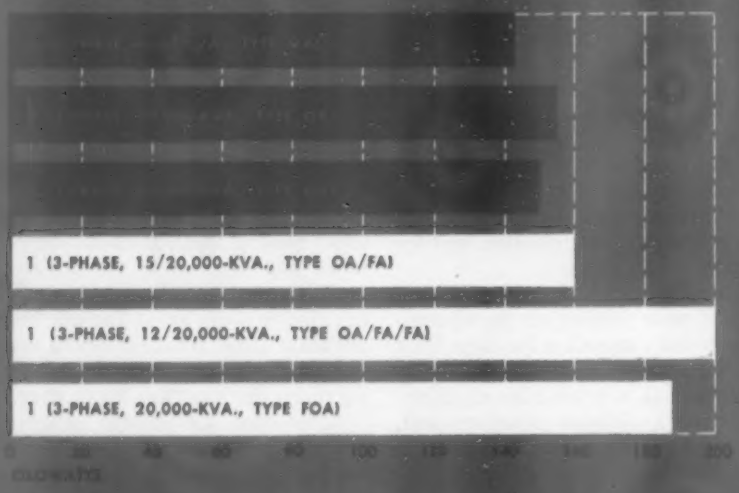
All this sound impractical? It isn't. It's a hard-headed approach. When I took this job, my boss (R. W. Cornell, Parker's manufacturing vice president) told me, "You have two things to do. Make a profit, keep the customers happy." Supervisory rotation helps me do both.

WEIGH THESE FACTS WHEN YOU BUY A TRANSFORMER

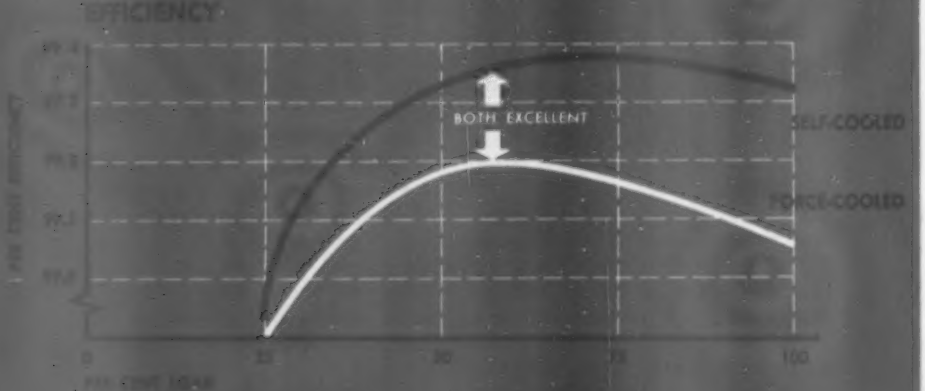
Transformers with forced cooling cost less than self-cooled units . . .



. . . but power losses from . . . self-cooled transformers are lower.



As far as efficiency is concerned, there's little to choose between the two types.



Buying a New Transformer?

Better not make a move till you know the answers to these two all-important questions: One-phase or three-phase? What kind of cooling? Better let an expert tell you what you need to know in order to get the most for your transformer dollar.

ONE PHASE OR THREE? The job of getting the most for your transformer dollar starts with that question. It's not a simple one to answer. The decision must be based on transformer reliability, risk of service interruption that can be taken, existing substation design.

Three-phase transformers predominate these days. Chief reason: lower initial cost—about 95% of that of three single-phase units, 72% of four single-phase units. Other advantages: less substation space, lower foundation costs, simpler station layouts in many cases.

On the other hand, not long ago all transformers were single-phase. Why? Transformer failures were common 25 or 30 years ago. So use of single-phase units was more economical. General practice was to have a spare single-phase unit in each substation, have all transformers equipped with wheels so spare could quickly go to work.

However, new insulating materials, better-quality insulating oil, lightning arresters, relay systems, greater design know-how all mean that transformer failure is almost a thing of the past.

But the important factor for you may be the design of your existing substation. If it has been specifically laid out for single-phase transformers, it may not be physically practical to use a 3-phase unit without costly layout revision.

Summary—Three-phase units are the logical choice unless there are special factors in your case.

What kind of cooling?

There are four main types of transformers, each with a different kind of cooling. The initial cost of each differs, as do the operating costs. The two costs tend to balance each other. We'll discuss the cost of each, and show accepted methods of making the necessary cost comparisons.

But first, here's a brief description of each type, in order of descending initial cost:

... *Type OA.* Most expensive. Oil-immersed and cooled by natural air circulation (self-cooled). Fin radiators increase radiating surface.

... *Type OA/FA.* Like the OA except that it has fans that force air over the radiating fins, boosting its rating between 15% and 33%.

... *Type OA/FA/FA.* Like the OA/FA except that it has two groups of fans to force air over the radiating fins, boosting its rating, usually about 67%. Minimum practical size: 12,000/15,000/20,000 kva.

... *Type FOA.* Uses pumps to circulate oil through external oil-to-air heat exchangers. Has no self-cooled rating as such, but will carry full load for short time without operation of its cooling equipment. Minimum practical size: 20,000 kva. (Type FOW is similar except that oil is circulated through oil-to-water heat exchangers.)

For lowest first cost—If all factors other than initial cost are ignored, forced-cooled transformers (Types FOW with cooling water or FOA without cooling water) would be used. Transformers with forced cooling can be applied to power systems at considerably lower dollar cost per kva. than self-cooled units. Top graph (facing page) demonstrates this by comparing initial costs of various transformer types for handling a 20,000-kva., 69-kv. load. However, lowest first cost is not the only yardstick to be used.

For lowest losses—If transformer losses were the only measure, all transformers would be self-cooled (OA) units. Center graph shows why. Losses are considerably lower than with forced-cooling units.

For efficiency—Self-cooled (OA) units are sometimes referred to as high-efficiency transformers; forced-oil-cooled (FOA) units as low-efficiency transformers. But, as bottom graph shows, these designations are misleading. Efficiency of both types is high. So this angle need not be considered in comparing transformer types.

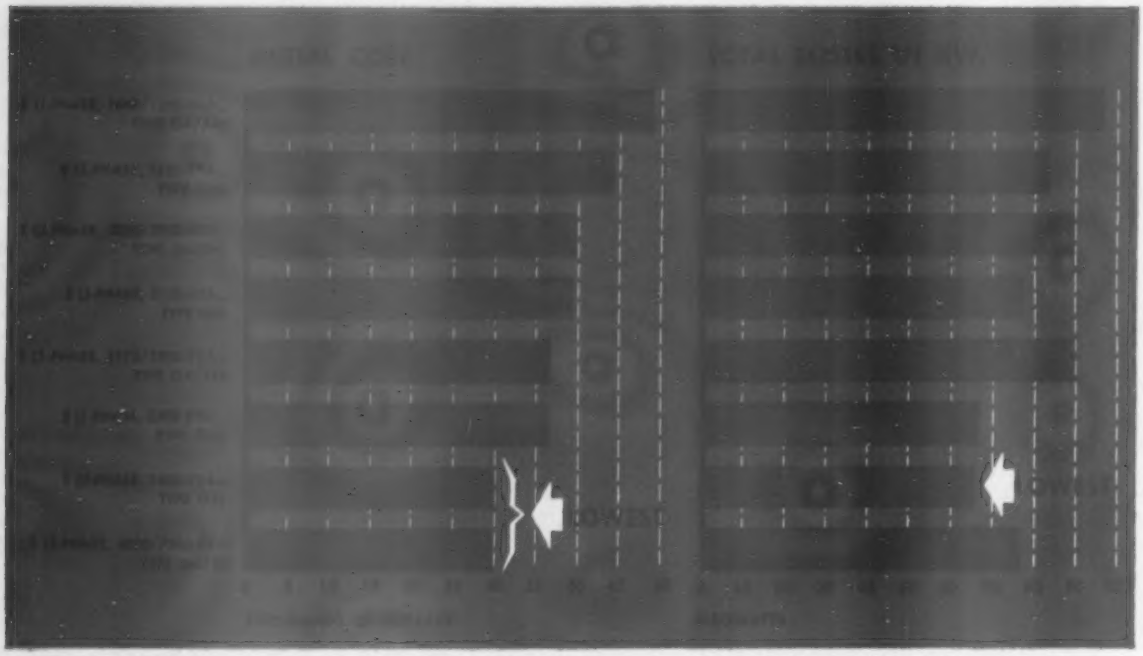
Summary—The graphs show that initial cost favors the use of a forced-cooling transformer, whereas comparative losses favor self-cooled units. Various factors must therefore be taken into account to see which type is cheaper over the projected life of the transformer, in the particular system in which you plan to install it.

On the next two pages you'll find three ways for making the necessary cost comparisons.

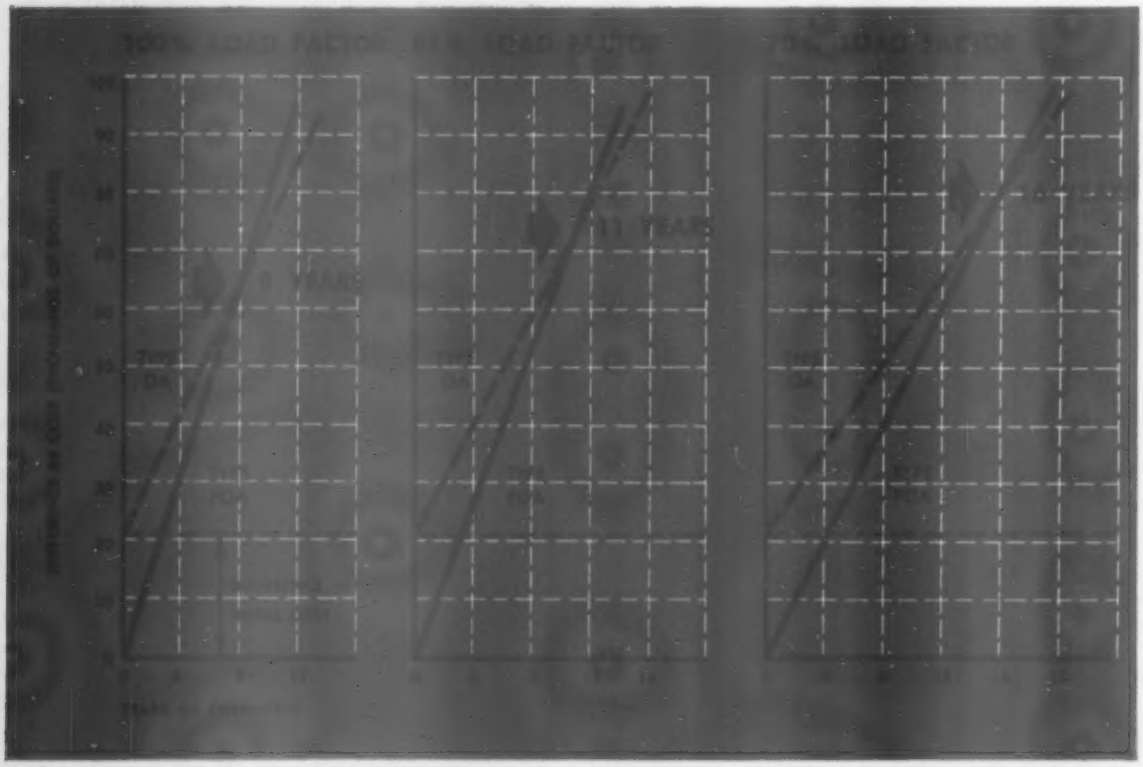
Turn the page

By L. W. SCHOENIG
Transformer Department
Allis-Chalmers Manufacturing Company
Milwaukee

BUYING A NEW TRANSFORMER? . . . *Begins on page 110*



COST VS. LOSSES can give you fair idea of best choice of transformer. Diagram above shows the cost of two types of low-cost transformers for handling 7500 kva. is about the same. So one with lower losses is the logical choice.



HIGH LOAD FACTOR means that the higher operating costs of a forced-cooled (FOA) unit will offset more quickly the higher initial cost of a self-cooled (OA) unit. So the higher the load factor, the better off you are with a self-cooled unit.

How to Compare Transformer Costs

Easiest way to determine overall cost of a transformer installation is to capitalize the losses, consider initial cost, and ignore all other factors, including cost of financing the transformer investment. This is an accurate method for applications under 20,000 kva.

Top graphs opposite show a typical case example — comparing various methods of handling a 7500-kva., 67-kv. load. Left graph compares initial costs of the various units. It can be seen that initial cost of the 6000/7500-kva., Type OA/FA (forced-cooled) and the 7500-kva., Type OA (self-cooled) units are similar; and that a saving of about 20% results from use of three-phase instead of single-phase Type OA units. Right graph compares losses. The 3-phase, 7500-kva., Type OA transformer has lowest total loss (about 7% less than losses of three single-phase Type OA units, and 15% less than the 6000-7500-kva. Type OA/FA.

Since initial costs of 7500-kva. Type OA and 6000/7500-kva. Type OA/FA are almost equal, and losses of 7500-kva. Type OA are lowest, logical selection would appear to be the 7500-kva. Type OA unit in this instance. (In the case of loads less than 20,000 kva., it will generally be found that 3-phase Type OA units are the most economical. There are cases, however, when single-phase Type OA units may be the better choice because of substation design or duplication of existing equipment.)

Load factor—Load factor has a definite bearing on total transformer losses, and thus affects capitalization. Where more accuracy in cost comparison is required, this should be considered. This type of comparison is shown in bottom charts opposite which compare self-cooled (OA) and forced-oil-air-cooled (FOA) 3 - phase transformers. Losses were evaluated at 5 mils per kwhr. for 100%, 85% and 70% load factor. Charts indicate that at 100% load factor it will take 8 years of use for cost of Type FOA's higher losses to offset Type OA's higher initial cost. (At 85% and 70% load factors, time required is 11 and 16 years respectively.)

THE HARD WAY—BUT THE ACCURATE WAY—TO COMPARE COSTS

TYPE ▶	OA	OA/FA	OA/FA/FA	FOA
1 Rating — kw.	20,000	15,000/20,000	12,000/20,000	20,000
2 Load factor (85%) — kw.	17,000	17,000	17,000	17,000
3 Impedance	5.95	7.95	9.92	8.9
4 Exciting current — %	3.33	2.67	2.25	2.55
5 Core loss	47	38	32	36
6 Load loss — kw. *Based on line 2*	60	86	114	102.5
7 Power for cooling — kw.	—	3.15	9.5	8.9
8 Total loss — kw. *Sum of lines 5 to 7*	107	127.15	155.5	147.4
9 Reactive loss — kvar.	1010	1350	1685	1510
10 Excitation loss — kvar.	566	454	383	433
11 Total loss — kvar. *Sum of lines 9 and 10*	1576	1804	2068	1943
12 Initial cost	$71,000	$60,500	$54,500	$50,250
13 Carrying charge *10% of line 12*	7100	6050	5450	5025
14 Demand charge *Line 8 x 10% x $250/kw.*	2675	3179	3888	3685
15 Energy cost *Line 8 x 8760 (hours in yr.), x $.005/kwhr.*	4681	5563	6803	6449
16 Kvar. cost *Line 11 x 10% x $7/kvar.*	1103	1263	1448	1360
17 Total annual cost *Sum of lines 13 to 16*	$15,559	$16,055	$17,589	$16,519

Detailed method — Perhaps a more thorough comparative analysis of the cost of a transformer installation is needed. These items must then be considered: cost of installing additional generating equipment to supply losses (if needed), interest on money required to finance initial transformer cost, interest on money required to finance cost of additional equipment, insurance, depreciation, taxes.

One convenient method of doing this: Convert all items to an annual charge. Cost can be represented by the carrying charge required for the investment. An approximate carrying charge (in per cent) can be determined as follows:

Interest	5%
Depreciation	3
Taxes	1.5
Insurance	0.5
	10.0

Actually, however, interest, insurance cost, and method of handling depreciation will differ for each system, resulting in carrying charges from 7.5% to 15%.

The more factors considered, the more complicated the problem. The table above shows a common — though somewhat involved — method of comparing different types of 3-phase transformers. This considers initial cost, demand charges for supplying losses, energy cost of losses, and reactive kva. A carrying charge of 10%, energy cost of 5 mils per kwhr., installed cost of generating equipment of $250 per kw., and installed capacitor cost of $7 per kvar. were used. With these assumed values, Type OA transformer has the lowest annual cost, Type OA/FA/FA the highest.

Important note: Energy cost, installed generating capacity cost, and the like, will vary for each system, and for each part of a system. So it's desirable to determine the values (assumed above for illustration purposes) that apply to the system or portion of a system on which the transformer will be located.

Summary—As you've seen, many factors—including initial cost, method of cooling, number of phases, cost of losses, accounting methods — affect the selection of power transformers. It cannot be said that one type is the right choice for all applications. The selection for a given application should be made by considering as many factors as are needed to get the desired degree of accuracy.

HOME SAFETY for workers begins in the plant. Every scratch is reported to Dr. Johnson, Nurse Mayhew.

DANGEROUS MATERIALS, in plant or at home, call for safety clothing like gloves, heavy apron, special lenses.

SAFETY LESSONS in plant quickly become lessons to take home. Every foreman must write a job hazard analysis for

Safest Folks in Town

G-E workers at Coshocton learn safe working in the plant (photos above), take safe living home to families (see survey findings below).

HAZARD CHECK is equally important for plant equipment and home appliances (washing machine, for example). G-E workers know that Employee Relations Supervisor Eckenbarger, Plant Engineer Wortman, and Plant Superintendent Drake must check every new machine before it's used.

TAKE SAFETY HOME from the plant. That's what General Electric's employees do in Coshocton, Ohio. Result: G-E workers and their families are the safest folks in town.

Proof? A recent town-wide survey of Coshocton showed that G-E workers (500 of them) and their families (1000 dependents) are safer in their automobiles, have fewer hospitalizing accidents at home, and are more safety-conscious than the other people in town.

Benefits for G-E? Plenty. In-plant safety training does this:

. . . Starts a beneficent circle. Habits formed at work become habits practised at home. These in turn reinforce safe habits and attitudes at work.

. . . Provides a new avenue for employee and community relations. That's important.

. . . Answers critics who contend that management doesn't accept its social responsibilities.

jobs he supervises. Here Foreman Arthur Randle tells workers what hazards are on job, how to avoid them.

SAFETY MEETINGS and family talk — not much difference. G-E requires 15-min. in-plant sessions once a month. They're held on production floor or in cafeteria. Here Foreman Passow shows his men some safety graphs.

. . . *Offers a concrete example* of the company's contribution to community welfare.

. . . *Becomes a selling point* for attracting more high-grade job applicants to the plant.

Where it starts — Safe living for G-E families begins at the plant. There workers have built up a record of over 6,000,000 man-hours without a lost-time accident — not one since Oct. 11, 1950. The reason: A non-stop plant-wide program that aims at safe work habits and safe attitudes all the time. The accompanying photographs spotlight some of the activities carried on in the plant program.

Town quiz — It was easy enough to measure safety results in the plant. But how far beyond the plant did the program reach? To find out, G-E engaged Group Attitudes Corporation, New York City, to make a town-wide survey. Interviewers spent a month in Coshocton (population 12,000) seeking answers to the question: "Do employees learn safe habits and develop safe attitudes at work that they bring home with them?" The quiz men called on over 350 homes, studied records of 378 traffic accidents, analyzed 428 non-occupational accidents that were treated at the local hospital.

What the survey showed—Here's what interviewers found out about G-E workers and their families:

. . . *They're safer on the road.* Personal-injury experience of G-E drivers in Coshocton is 16 times better than the national average, 6 times better than the rest of the town. In the bashed-in-fender and busted-lamp-post departments, G-E workers and their dependents had only one accident for every two that happened to non-G-E drivers.

. . . *They have fewer home accidents.* Only 11% of G-E families remember any home accidents that happened in the past year, compared with 18% of non-G-E industrial families and 21% of non-industrial families. But note this: G-E's liberal benefit plan caused more G-E families to ask for and receive hospital care for home accidents than the other families in town. Researchers concluded that if the plan had not offered coverage of bills from $3.50 to $10, many G-E people would have passed up treatment by the doctor and would have taken care of themselves at home.

. . . *They know more about safety.* And they practise what they've learned at home. For instance:

Out of all G-E households, 95% know something about the plant safety program — against only 55% of non-G-E industrial families. This figure is based on positive statements such as: "There aren't many lost-time accidents," "They make them wear safety clothing," and "They have guards on the machinery." The small gifts, pins, and mementos — awarded periodically — are one reason for the favorable opinion in G-E homes. A good many housewives volunteered comments about these tokens of achievement—showed them off proudly.

Some 52% of G-E breadwinners discuss specific safety measures at home, compared with 40% for other industrial families. For example, 10% of G-E wives say their husbands have told them how to prevent fires, and 9% say their husbands have warned them about cluttered stairs.

. . . *They use plant safety ideas at home.* Some 50% of them say they do, against only 25% for other industrial workers. Knowing that some people like to please by answering "Yes" and that others answer "No" to avoid being specific, the interviewers approached this question obliquely. They asked no point-blank questions, but returned to the subject two or three times to make sure answers were factual.

IN NATURE, hard water built this 62-ft. high dolomite dome. But it took 200,000 years to do it. The dome is formed from the accumulated deposits of ordinary impurities found in raw water.

IN INDUSTRY, the same commonplace impurities in raw water clogged these pipelines in a few years. For such water you may pay only 6¢ to 30¢ per 1000

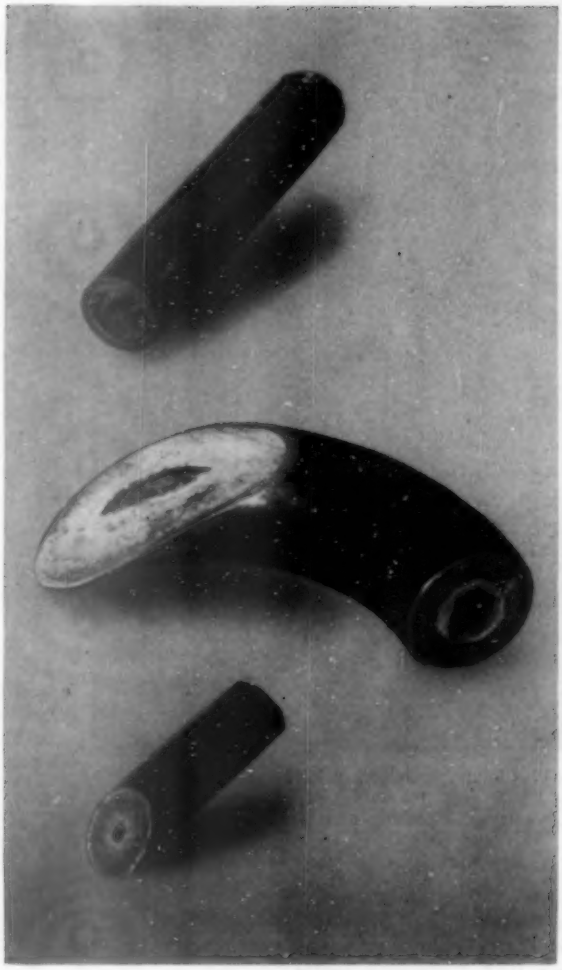
Why Water Spells Trouble

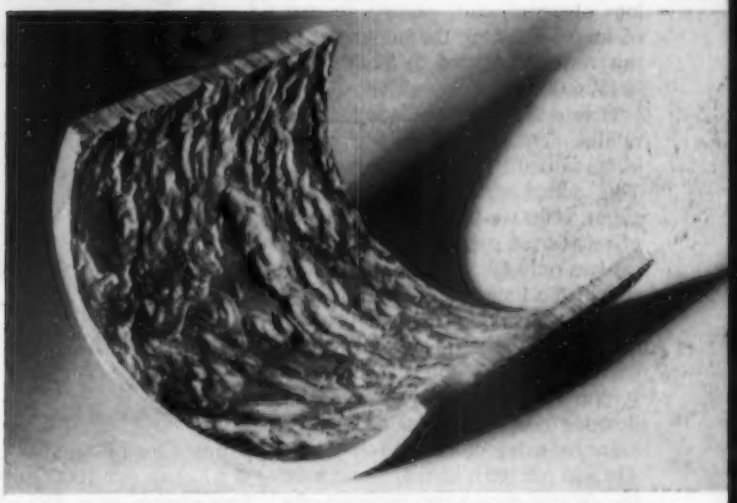
Today water is hard to find, and no bargain even if cheap. It'll ruin pipelines (photos above), drain your profits. That's why you should know these plain facts about what water is—and how it will hurt your plant if you don't watch out.

THE RAW MATERIAL that is used in greatest amounts in practically all industries is water. In this country alone the sum total of industrial water requirements reaches the astounding figure of 360-million tons or 87-billion gallons per day. But, despite this daily familiarity with water, what the average person knows about it is that there are just two kinds—fresh water and salt water. And that the fresh water comes in four forms—hot, cold, ice, and steam. Also, he's probably

By ESKEL NORDELL
Director of Technical Information
The Permutit Company, New York City

Photos: The Permutit Company





gallons. But that's no real bargain—not when you count cost of closed-up pipes, shutdowns, inefficiencies in processing, damaged equipment, faulty products.

TUBERCLES AND PITS (top and bottom photos respectively) in water lines come from corrosive waters containing dissolved oxygen and with a low pH. If you scrape tubercles off, you find pits beneath.

heard that the chemical formula of water is H_2O. And it's dollars to doughnuts he believes rain or snow is absolutely pure water.

So he might be shocked to learn that nature's distilled water—rain, snow, sleet, or hail—is not as pure as the man-made article he puts into his car battery, because it has to fall through an atmosphere contaminated with dust, dirt, soot, and gases. And it picks up varying amounts of these impurities on the way down.

Cheap but costly—Would you be surprised to know that water is not only cheaper than dirt, but that it is also the cheapest thing you can possibly buy? It's true. Water for households usually ranges in cost from 25 to 50 cents per thousand gallons. A thousand gallons weighs a few hundred pounds over 4 tons. So you pay only some 6¼ to 12½ cents per ton for water delivered right to your home. There isn't any other material on earth—dirt or anything else—that you can get delivered to your home at such a rock-bottom bargain price.

Industry pays even less for water because, in quantity lots such as it uses, the price of water in different localities ranges from 6 to 30 cents per thousand gallons. So if an industry buys its water, it pays only from 1½ to 7½ cents per delivered ton. If it has its own water supply, the costs obviously are even less. The fact is, over 90% of the total amount of water used in industry is drawn from its own supplies.

Viewed from the usage angle, however, raw water can be a mighty expensive raw material. This is because, like all other raw materials, raw water contains impurities. These impurities can cause so many processing difficulties and such serious economic losses that they often make raw water very costly to use. Just how costly depends on the processes

being carried out, and on the amounts of harmful impurities in the raw waters that are used.

A couple of examples will illustrate this. The first example involves a scouring process with soap. The raw water, which was purchased from a municipality at 12 cents per 1000 gallons, contained 10 grains per gallon of hardness. Since each grain per gallon of hardness wastes 1½ pounds of soap per thousand gallons, 1000 gallons of water wasted 15 pounds of soap. At 16 cents per pound, therefore, the impurities in this water boosted the process cost by $0.16 x 15 = $2.40 per 1000 gallons. Based on a daily usage in this process of 15,000 gallons of water, daily penalty in cost of soap wasted by the impurities in this water amounted to $2.40 x 15 = $36.00.

Here's a second example. A ceramics plant was getting 8% in rejects caused by water impurities. This added up to a total loss of about $6000 a week. The amount of water used per week in this process was only 62,500 gallons. So the cost of the impurities was $6000 ÷ 62.5 = $96 per 1000 gallons. Yet the same amount of raw water alone cost only a few cents.

Water treatment pays—Many industries today are paying heavy penalties for using untreated raw water. The sad part of it is, they don't have to. Water treatment methods are available to eliminate or neutralize the effects of all known water impurities. And the cost of the equipment and supplies needed to install and operate a water treatment plant is usually recovered, on the average, in 3 to 5 years. After that, it's clear profit.

Let's go back to the two examples just given. Take the story of soap wastage. The company finally installed zeolite water softeners. This equipment softened not only the 15,000 gallons used with soap, but all the 60,000 gallons used daily in that plant. Cost of softening ran 4½ cents per 1000 gallons, or $2.70 a day. So savings were $36 less $2.70, or $33.30 per day.

At the ceramics plant, demineralization of the water cured the trouble. Rejects shrank to the vanishing point. Cost of demineralization ran at 57 cents per 1000 gallons. Therefore savings were $95.43 per 1000 gallons. This added up to a savings of $5965 per week, which paid for the installation in the first week of operation!

HARD WATER WASTES SOAP. Cloudy precipitate in bottle at left results when soap is all used up in making hard water soft. No suds there. But soap makes plenty of suds in soft water (right), and soft water remains crystal clear.

A VARIETY OF TROUBLES

The troubles water impurities are causing in your plant and the dollars you could save by eliminating them depend on two things: the processes you are using, and the amounts of harmful impurities in the raw water or waters you use.

Briefly, among the great variety of troubles water impurities may cause are the following:

. . . *Clogging in water heaters,* piping, pumps, valves, nozzles, recirculating equipment, pasteurizers, washers, bleach tanks, and so on.

. . . *Reduced flow rates* and loss of water pressure.

. . . *Wastage of soap,* alkalies, phosphates, and other detergents and scouring agents.

. . . *Disagreeable tastes and unpleasant odors.*

. . . *Streaks, stains, spots,* and off-colors.

. . . *Uneven dyeing,* harsh feel, rancid odors, and loss of brilliance.

. . . *Wastage of materials* and poor quality electro-plating.

. . . *Breaking of emulsions* in manufacture of synthetic rubber and other materials.

. . . *Inefficient cooling* in condensers, coils, and water-jacketed equipment.

. . . *Overheating* and metal failure in steam boilers and other direct-fired equipment.

. . . *Contamination of chemicals,* drugs, cosmetics and various other preparations.

These and a great variety of other troubles cause lowering of product

WHAT IT TAKES TO SOFTEN HARD WATER

Water Hardness		Wastage In Pounds of Material Per 1000 Gallons						
Grains per Gallon	Parts per Million	Pure Soap	50-50 Soap and Soda Ash	Soda Ash	Sal Soda (Washing Soda)	Caustic Soda	Tri-Sodium Phosphate	Sodium Meta Silicate
1	17	1.50	1.81	.15	.41	.11	.36	.30
2	34	3.00	3.63	.30	.82	.23	.72	.61
3	51	4.50	5.43	.45	1.23	.34	1.09	.91
4	69	6.00	7.25	.60	1.63	.46	1.45	1.21
5	86	7.50	9.06	.76	2.04	.57	1.81	1.52
6	103	9.00	10.88	.91	2.45	.69	2.17	1.82
7	120	10.50	12.69	1.06	2.86	.80	2.53	2.12
8	137	12.00	14.50	1.21	3.27	.91	2.90	2.42
9	154	13.50	16.31	1.36	3.68	1.03	3.26	2.73
10	171	15.00	18.13	1.51	4.09	1.14	3.62	3.03
15	257	22.50	27.18	2.27	6.13	1.71	5.43	4.55
20	343	30.00	36.25	3.03	8.17	2.29	7.24	6.06
30	514	45.00	54.38	4.54	12.3	3.43	10.9	9.09
40	686	60.00	72.50	6.04	16.3	4.57	14.5	12.1
50	857	75.00	90.63	7.55	20.4	5.72	18.1	15.2

Source: Reinhold Publishing Co.

YOUR MONEY DRAINS AWAY when you wash or scour with hard water. For every added grain of hardness per gallon, you must use more soap or other cleansing agent just to neutralize the hardness of your process water.

quality, wastage of materials, and increased costs for labor, repairs, and replacements. Space does not permit listing all the difficulties encountered throughout the various industries. There are over 300 different types of industries that have experienced process and manufacturing troubles from water impurities. The chances are, yours is among them. But they all licked the problem by water treatment. So there's every reason to say you can, too.

Why natural water is impure

It seems hard to believe, but often the last thing a company looks at when building a plant is the nature of the water supply. Also, when troubles occur, the last thing that's suspected is the quality of the water. To many people, water is just water.

Even plants with chemists have been known to overlook water as a source of trouble. There is the case of a certain textile plant that was having trouble with spots on its goods after a washing operation. Damages ran into thousands of dollars. The plant chemists frantically tested the material, the dyes, other chemicals, to find out why.

The spots appeared and disappeared at intervals of several days without rhyme or reason. No one suspected the water, which was supplied from an outdoor storage tank. Finally, after weeks of fruitless research, someone discovered that because of dry weather the water plant operators were alternately using pond water and well water to fill the supply tank. The changing quality of the water had caused the trouble.

So you can't assume water is just water, or that the same quality comes out of the same tap all the time. Its composition depends on its source. And in some cases on the time of the year. You'll see why in a moment.

Meteoric waters—All our fresh water supplies originate in moisture precipitated from the atmosphere as rain, hail, sleet, or snow. Collectively, these are known as "meteoric waters." As they fall through the atmosphere, they come in contact not only with the gases of which the atmosphere is composed, but also with suspended impurities such as dirt, dust, soot, pollen, and various other materials. Meteoric waters dissolve some of these. Some they carry along in suspension as they fall earthward.

Therefore these waters, even before they strike the earth's surface, contain dissolved as well as insoluble impurities. These impurities may include hardness, sodium, ammonium, chlorides, sulfates, nitrates, and acid. The acid is usually sulfuric (derived from the sulfur dioxide in flue gases) and occurs most commonly in cities, and during the winter months when furnaces and other fuel-burning installations are going at full blast.

On the average, about one-third of these precipitated waters evaporates into the atmosphere. One-third collects on the surface to form surface waters — brooks, streams, rivers, ponds, lakes, and reservoirs. The remaining third sinks into the ground to form the ground waters that later may be tapped by springs, wells, infiltration galleries, or the roots of vegetation.

Surface waters—As the rain strikes the ground, or the snow, sleet, or hail melts, it comes in contact with a variety of rocks, clay, soil, and organic matter. Some of these rocks, such as limestone, dolomite, and gypsum, are appreciably soluble. Others, such as quartz, shale, and granite, are relatively insoluble. Therefore, the content of dissolved mineral matter in surface waters in limestone or similar areas is higher than in surface waters originating in areas containing less soluble rocks.

In addition to dissolved mineral matter, surface waters may contain noticeable quantities of suspended insoluble matter. This is called tur-

bidity. As everyone knows who has observed a river after a heavy rainfall, the turbidity of a flowing stream may vary greatly at different periods. In the course of a year it can reach ten to several hundred times its minimum turbidity.

What is not so widely known is that lake, pond, or reservoir waters, while quite clear most of the time, may also show startling variations in turbidity. Lakes Erie and Michgan, for example, not only show wide variations in turbidity, in the ratio of one to over a hundred times, but also considerable variations in several different locations at the same time.

Surface waters also may contain both living and dead micro-organisms such as algae, fungi, slimes, and other bacteria. Many of these growths, on decaying, impart disagreeable tastes and odors to the water.

The dissolved mineral matter in surface waters usually consists principally of salts of lime and magnesia (which cause hardness), sodium salts, and silica. Some of these surface waters may also contain small but troublesome amounts of iron or manganese, which are often in an organic form.

Ground waters—Deep-well waters and most spring waters, because of the filtering and adsorbent action of the strata through which they have passed, are usually quite clear and colorless, although there are some exceptions. Also, these waters as a rule are known to be free from or decidedly low in microorganisms.

However, because of their much more intimate and longer contact with larger masses of minerals, they are usually higher in dissolved mineral matter than surface waters originating in the same area.

The dissolved mineral matter consists mainly of salts of lime and magnesia, sodium salts, and silica. Also, many ground waters contain objectionable amounts of iron or manganese. Such iron- or manganese-bearing ground waters may be clear and colorless when first drawn. But on standing in contact with air, they cloud and then deposit yellowish-brown or grayish-black iron or manganese compounds. Some ground waters also contain hydrogen sulfide, which gives them a rotten egg odor.

When do water impurities hurt?

It all depends on the plant usage. We are talking strictly about process water now—not drinking or sanitary water supplies. Nor do we include waste sewer water.

As already shown, hard water can prove costly where soap cleansing enters the process. Yet it would be foolish to soften a low-hardness water that is used "once-through" for cooling purposes—there would be no gain in performance. But it might pay to treat such cooling water to eliminate organic growths, and thus stop clogging of pipelines.

Let's examine the main impurities found in industrial water to see at what stage they are harmful to particular industrial usages.

Sediment and turbidity — Both sediment and suspended matter, usually known as turbidity, are objectionable for such obvious reasons that it's unnecessary to detail them. Sediment is the term that is usually applied to the relatively coarse and easily settled mud, sand, or silt found in water. And turbidity or suspended matter is the term usually given to the finely divided, semi-colloidal or colloidal matter found in water. Frequently, however, the two impurities are lumped together and both measured as turbidity.

Tolerances for turbidity vary according to the end use of the water. In general, for fine process work turbidity should be under 5 parts per million (ppm.), and even less for special work. The U. S. Public Health Service standard for drinking water is 10 ppm. Tolerances for most process work should be well under this figure.

Color and organic matter—The organic impurities found in water consist of soluble or colloidal matter derived from decaying vegetation. They are usually evident as color, and as living and dead organisms. Organic impurities are commonly found in surface waters and are usually either absent or low in amount in ground waters. Waters originating in swampy areas are usually highly colored. In such cases, iron or manganese is also frequently present either in an organic or colloidal form.

Color is objectionable for practically all industrial process uses because it tends to stain or discolor nearly everything with which it comes in contact. For most processes the color should not exceed 10 ppm. And for special uses color should not exceed 5 ppm.

Organic growths — Organic growths are common in three places: in surface waters, in waters (whatever their origin) that have been stored in open reservoirs and in reused waters. Algaes, fungi, crenothrix, beggiatoa, slimes, and other organic growths may cause a great variety of troubles such as stains, spots, discolorations, tastes, and odors in many finished products. They can also cause clogging of pipes, pumps, nozzles, recirculation equipment, and the like.

Some of these growths may be troublesome only in the warm summer months and may practically disappear during the rest of the year. Others may be more or less troublesome at all seasons. Briefly, algae grow in relatively quiet waters, exposed to sunlight.

Copper sulfate and chlorine are used to kill such organisms. Sometimes reservoirs are covered as a means of discouraging their growth. Fungi tend to grow on moist organic materials that also furnish food, such as pulp.

The term "crenothrix," strictly speaking, should be applied to only one type of iron and manganese bacteria. But popularly it is collectively applied to all of them — there are over 20 varieties known. These iron and manganese bacteria grow in tanks, pipelines, etc., in which iron or manganese-bearing waters are used. These rusty brown (iron) or grayish to black (manganese) growths cling to and clog pipelines and pumps. Often they break loose in large masses that, on decaying, leave unpleasant tastes and odors.

In sulfur waters, sulfur bacteria may cause the liberation of elemental sulfur to form turbid, whitish deposits or threadlike clogging growths. There is another kind of bacteria that can reduce sulfates

to sulfides, thus giving the water a rotten egg odor. This blackens and corrodes iron, copper, and brass piping and fixtures.

Hardness—The hardness of a water is caused by (and is proportional to) its content of soluble calcium and magnesium salts. These salts are the bicarbonates, sulfates, chlorides, and, occasionally, nitrates of calcium and magnesium. They are present in widely different proportions in various waters. Thus one water may contain practically nothing but the bicarbonates. Another may contain a large amount of bicarbonates and a relatively small amount of sulfates. Or vice versa. And so on down the line.

Furthermore, the total amounts of calcium and magnesium salts (which define the total hardness contents) vary greatly in different water supplies. With the exception of sea water and other highly saline waters, the total hardness contents of usable fresh water supplies can range from less than 1 grain per gallon (17 ppm.) up to slightly over 100 grains per gallon (1700 ppm.). Waters ranging near the last-named figure are considered so exceptionally hard as to be unusable in any industrial plant. The great majority of natural waters are found in a range of from 1 to 30 grains of hardness per gallon (17 to 510 ppm.).

Hard waters, as is well known, form scale when they're heated, evaporated, or brought in contact with alkaline materials. Also, when brought in contact with either rosin or ordinary soaps, they precipitate insoluble calcium or magnesium resinates or soaps. Their scale-forming properties depend not only on the amount of hardness present, but also on the nature of the hardness compounds. The precipitating action with rosin or ordinary soaps is proportional to the total amount of hardness present and is completely independent of the nature of the hardness compounds.

Scale and sludge—Scale formation may occur in condensers or in other water-jacketed eqiupment, water heaters, hot water piping, pumps, valves, nozzles, recirculating systems, pasteurizing equipment, bleach tanks, boilers, and similar equipment. It is important to note that various results can occur in different equipment. The fact that a water doesn't form scale under one set of conditions doesn't mean that it won't form scale under an entirely different set of conditions.

For example, a low-hardness cooling water may not form scale when slightly warmed in passing only once through the system and then to waste. But when this water is recirculated through the cooling system and a cooling tower—or if it is concentrated in an evaporator or boiler, or comes in contact with caustic soda, soda ash, ammonia, or some other alkaline material—it will form scale.

The hardness constituents do not always precipitate as an adherent deposit (scale). Under certain conditions they may precipitate in a non-adherent form (sludge). Also—and this is the usual occurrence—one portion may precipitate as sludge while another portion appears as scale.

Hard water scales are poor conductors of heat. They have thermal conductivity constants ranging usually from K=0.75 (the same as firebrick) to 1.5. For comparison, steel has a constant of K=26.0.

In direct-fired vessels, scale may cause serious overheating and failure of the metal because heat transmission is slowed up. Even thin scales in condensers and other cooling equipment may result in inefficient operation. In a boiler, scale only 0.1-in. thick (assume K=0.75) will cause the metal to heat up 56 degrees F. hotter than the water at a rate of heat transfer of 5000 Btu. per square foot per hour. At transfer rates of 10,000 and 60,000, the temperature differentials will be 111 and 667 degrees respectively.

Hard water and soap—The economic losses in industry caused by washing with soap in hard water can be substantial. The table on page 119 shows the wastage of pure soap and other common wash ingredients when using waters having hardnesses of from 1 to 50 grains per gallon. The soap and hardness combine to form useless precipitates that appear as insoluble curds.

These curds stick in woven or fibrous materials, giving a harsh feel. After long standing they also develop a disagreeable, rancid odor. Moreover, repeated launderings in hard water greatly decrease the useful life of textiles — plants that launder their own towels, aprons, uniforms, etc., have found this out by sad experience. As mentioned earlier, softening of water results in large savings in "soap and builder," ranging from 30 to 75%. But the dollar savings accomplished by extending the life of the laundered articles can be even greater. In one case, softening a water of 6-grain-per-gallon hardness has extended the life of various laundered materials an average of 27%. In another case, softening a water of 8-grain-per-gallon hardness has extended the life of the laundered materials from 20% to 45%. (Note: Life is based on the number of launderings given the materials before discarding.)

Returns on the investment in softening equipment in such industrial plants are seldom less than 40% per year.

Iron—Iron in deep-well waters is usually present as a soluble, colorless salt. Contact with air oxidizes it to an insoluble rusty, yellowish-brown precipitate, that tends to stain everything with which it comes in contact. Iron-bearing waters also favor the growth of iron bacteria, which form clogging masses up to 500 times their original weight. When these decay, they impart obnoxious tastes and odors to the water. In surface waters and some well waters, iron may occur in an organic form. Tolerances for iron should not exceed 0.2 ppm. for most uses and not over 0.1 ppm. for special uses.

Manganese — Similarly to iron, manganese occurs in deep-well waters as a colorless salt. It may occur in organic form in surface waters and some well waters. It forms grayish to black deposits and, like iron-bearing waters, it favors the growth of bacteria. These likewise form clogging masses and, on decaying, impart obnoxious tastes and odors to the water. Tolerances for the manganese should not exceed 0.1 ppm. for most uses, and not over 0.05 ppm. for special uses.

Silica — In moderate amounts, silica is usually unobjectionable in most process waters. In higher amounts, however, it is said to impart "tinny" characteristics to paper and to increase the ash content of some other cellulose products. In steam boilers it may form hard "silica" scales, and in high-pressure boilers it may pass over with the

steam and form hard, glassy deposits on turbine blades.

Dissolved gases — The dissolved gases found in various water supplies are oxygen and nitrogen (from dissolved air), carbon dioxide, and hydrogen sulfide.

. . . *Oxygen* is a common constituent of surface and other waters that have been aerated or exposed to the atmosphere. Many deep-well waters, on the other hand, are free of dissolved oxygen. Waters containing dissolved oxygen are corrosive not only to ferrous metals but also to galvanizing and brass, which it "dezincifies," leaving spongy and structurally weak copper behind. These corrosive properties increase as the pH value of the water gets lower (pH is a scale, ranging from 0 to 14.0, used for measuring both alkalinity and acidity; 7.0 is the neutral point. Values below this indicate acidity; above it, alkalinity). Also, corrosive properties increase with elevations of temperature, maximum effects being at about 160 to 180 F.

. . . *Nitrogen* is an inert gas and exerts no corrosive effects.

. . . *Carbon dioxide* is usually low in surface waters, because it escapes to the atmosphere. But it's common in ground waters. Since it is not only a product of combustion (and breathed out by animals) but also of decaying vegetation, appreciable amounts of it are usually contained in well waters in swampy regions or under layers of peat. When carbon dioxide dissolves in water, it forms to a certain extent a weak acid—carbonic acid. Carbon dioxide is corrosive of itself and also increases the rate of dissolved oxygen corrosion. In normally alkaline waters, the pH value is dependent on the relative proportions of free carbon dioxide to alkalinity.

. . . *Hydrogen sulfide* is found in some well waters — the so-called sulfur waters. It's poisonous, has the characteristic odor of rotten eggs. Sulfur waters are objectionable for nearly all industrial uses because of their pervading odor and corrosive properties. The corrosion product formed by the action of hydrogen sulfide on iron is black. That's why black water is often found in pipelines carrying sulfur water.

What to do about your water

If the raw water is suitable "as is" for specific uses in your plant, then obviously there's no need for treating it. But if not, then it should be treated to make it suitable. As an extreme example, muddy Missouri River water can be and is used for cooling surface condensers in power plants. In fact, the sediment polishes the inside of the tubes so they're almost mirror-bright. Yet it would be impossible to use this water as a process water in any industry, or as a boiler feed water, or even as a cooling water, with any other type of cooling equipment.

It's also a mistake to resign yourself to the high cost of poor water conditions because you think nothing can be done about it.

For instance, there was one place that endured the ravages of a sulfur water for years. This water had the terrific hardness of 100 grains per gallon (1700 ppm.). Every year these people had to rip out the hot-water piping and fixtures because they scaled up so badly that the flows of water faded to a trickle. And every three years, they had to rip out all the cold-water piping because the sulfur water corroded it. Still, they'd been doing this so long they had become quite used to it. They did admit they'd had a little trouble with water heaters because those scaled up rather fast—one batch getting scaled up just about solid in less than six weeks. However, this was a couple of years ago, and they'd solved that difficulty since. How? "Well," they said, "we buy second-hand Scotch marine type boilers, use them for water heaters. They're quite a bit oversized, you know, so it takes a while before they get scaled up." Obviously, this is one company that never heard of a water treatment plant!

Get a survey—Almost everybody knows an industry's water supply should be from a source adequate for both present needs and future expansion. And should be available at sufficient pressures and flow rates to meet peak demands and provide fire protection. But often ignored is the need for a suitable quality for various uses.

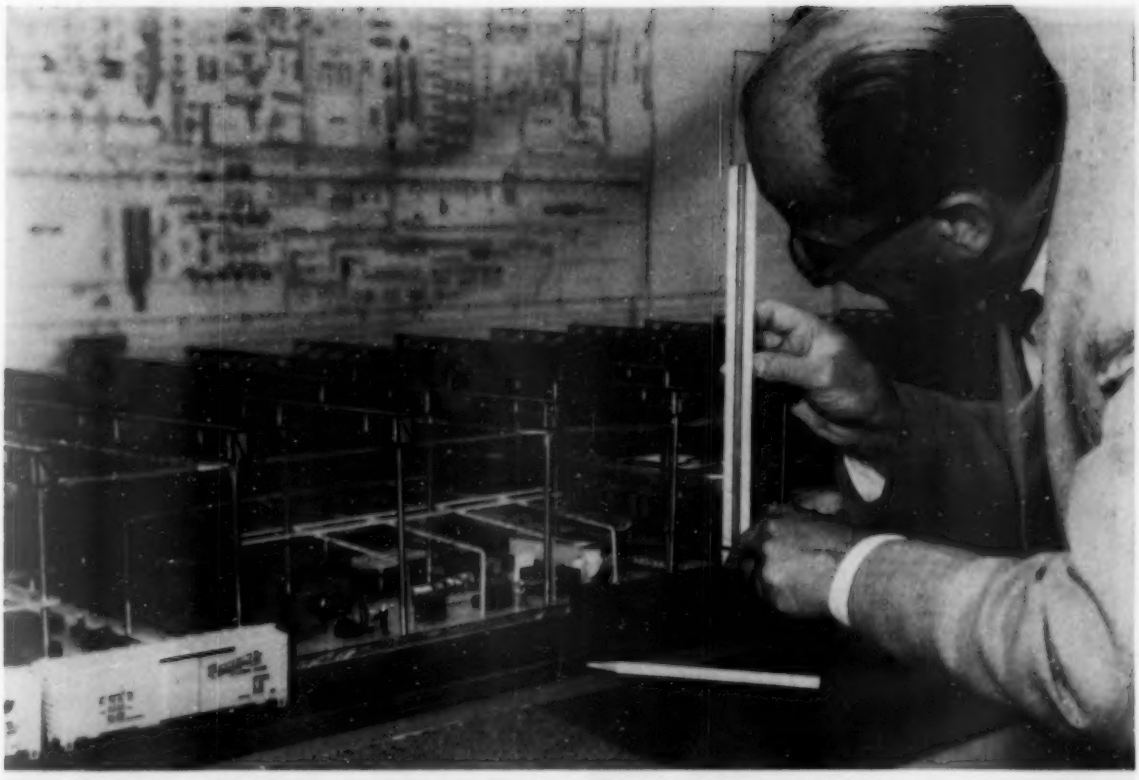
To determine quality, chemical analyses are necessary. If a municipality supplies the water, it should be able to give data on composition and possible changes. Usually such analyses are not "industrial-water" analyses. But they help when studied with complete analyses, which can generally be obtained without charge from the manufacturer of water-treating equipment.

What if the water supply is private? If drawn from wells, analyses should be made from each well. For in many locations, wells at the same depth and only a few hundred feet apart differ markedly in composition. If it's a surface supply, find out the approximate variations that may occur during the year. These are especially needed for flowing streams. Government and state publications often contain periodic tests, especially on larger rivers. Often the records of manufacturers of water treating equipment contain unpublished facts.

Does your water require treatment? To find out, call in an expert. He can advise what treatments are needed for different uses, what types of equipment to use. He can quote you capital costs, and operating and maintenance costs.

But deal only with established, reputable manufacturers of water-treatment equipment. Be on your guard against wonder-working, magic gadgets — no matter what glittering testimonials they have, or what scientific double-talk is used to describe them. If the operation of such "miracle" equipment cannot be clearly explained in plain English, then beware of it.

COMING: ***A second article on water, scheduled for November FACTORY. In it, Mr. Nordell will tell the best ways to remove common impurities from industrial water.***



SCALE MODEL at Carrier sparks new plant ideas for today—and for the plant of the future.

Pre-Testing Dream-Plant Ideas

New use for scale model! It's helping Carrier find out what belongs in its "super-plant of tomorrow." And the methods that will make for perfection.

THE SCALE MODEL you see in the photo above is an idea tester—and idea stimulator. With it, Carrier Corporation . . .

. . . *Improves on materials-handling ideas* that are still little more than a gleam in somebody's eye.

. . . *Spurs new advances* in plant design, production flow, and materials handling.

. . . *Sharpens up young engineers* for the jobs they'll face tomorrow.

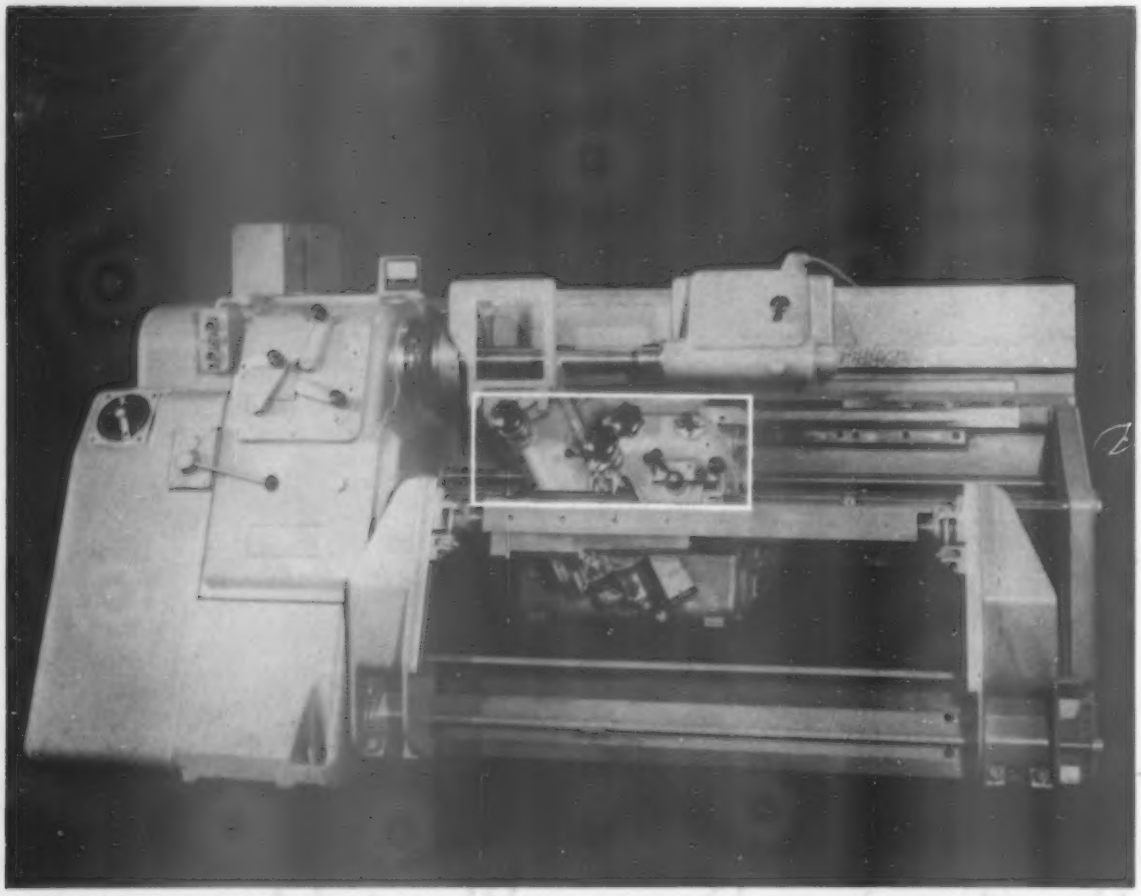
How does Carrier use it? "Just keep tossing the most advanced ideas from others into a scale model of your dream plant. Then turn your young engineers loose on it," say the Carrier people.

Why build a model? To find out what should go into a perfect plant for making central-heating and air-conditioning equipment. Carrier felt the rewards of finding out would be worth the effort. The company's manufacturing research group built it at Syracuse in 18 months.

Cost? $4600. (But in terms of fast training for young engineers it's expected to save far more than it cost.) The model could go into full-scale construction today. Instead Carrier's manufacturing engineers are using it to create new advances —and to make improvements on existing methods.

Idea sources — The miniature plant developed from visits to more than 20 major companies, plus many small ones. From these visits Carrier picked up ideas incorporating the best of manufacturing and materials-handling practices, built them into the model. Today the model is booming—in ideas.

The payoff—Mostly in improved materials-handling concepts. Engineers "imagineer" with the model, get ideas for better movement of parts from department to department. They see and solve problems in solid terms, know today how advanced methods will fit into future plants. *Example:* One engineer ran into trouble in re-routing overhead conveyors, couldn't visualize the effect. The model gave him his answer. It showed him all he needed to know about headroom for personnel and machines, clearances, curves and drops, guarding. That way he was sure not to make tomorrow's errors—sure that perfection would come as ordered.



MACHINE DESIGNERS have long gone after—and got—"optimal location" of controls. On this lathe, for instance, all controls except a foot-switch bar are inside the rectangle, right where the operator can easily reach them.

Best Place to Locate Controls...

...or anything to which the worker must give visual or manual attention is within normal reach—and where he can perform required motions in shortest time. Take your cue from the equipment designers (see photos) and the physiologists.

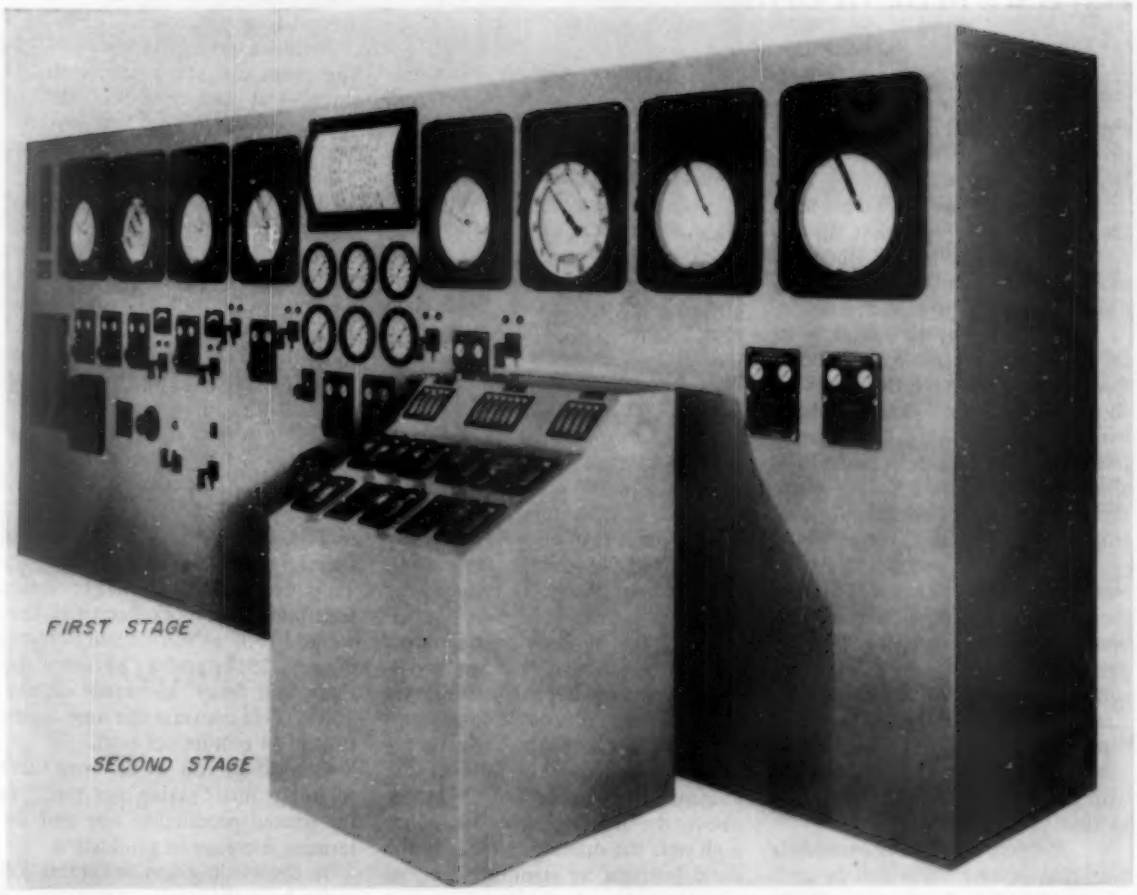
TAKE A LOOK at the lathe in the photo directly above. It's typical of what you saw if you visited the Machine Tool Show last month. Note where the designer put the controls. All within the operator's normal reach and vision.

We'll come back to this lathe later, because we want to show you how relocation of controls alone will account for as much as a 3% increase in output. But first look at the instrument panel and console on the opposite page. See how the same principles used by the machine designer have been applied by the instrument maker.

First stage in simplification was to remove instruments from point of performance — and centralize them in a panel 15 feet long, 78 inches high. Second stage was to miniaturize the controls and assemble them on a console. Console is 36 inches high. Maximum reach is 10 inches. It contains approximately same number of electrical and pneumatic controls as original panel.

Lathe and console are but two examples. Everywhere you look, that's what's happening today. And you may be surprised to learn how easy it is to apply the same principles elsewhere in the plant.

By DICKEY DYER, Business Manager
The Work-Factor Company, and
W. H. COMPTON, Partner
Wood-Compton Company, Cleveland



SAME PRINCIPLES used by machine designers were applied here to two-stage simplification of power generation controls. First step was to centralize; second, to miniaturize and assemble on a console within operator's normal reach.

As a plant operating man, you probably consider both machine design and physiology specialized fields that are outside your own area of activity. In a way, that's right. But in a very real sense, it's wrong, too.

There are many times within the normal scope of your job as a plant operating man that you can and should—because it's profitable—make use of the knowledge that guides the designer and the physiologist. You don't have to become an expert in their fields. But understanding just a few of the capabilities and limitations of the human anatomy and nervous system can help you plenty.

Where can you use this sort of information? Practically everywhere. Both line and staff people are moving things around almost constantly. And many such moves involve location of controls, instruments, gages, signals, and the hundred-and-one details of a workplace. *Where* you relocate such controls and gadgets will make a real difference in how well the new set-ups work and how much they will save—or won't save.

"Optimal location" of levers, dials, etc., is the fancy term for the "one best place" to put things on a tool. Smart machine designers are constantly striving to find it. *But the same principles used by the machine designer can be used in determining optimal location for anything to which the worker must devote his attention, either visual or manual.*

The information needed to pick an optimal location is of two parts, much of it probably already floating around your shop:

1. Predetermined elemental time standards. By using them you can make a comparison of the time it will take an operator to perform required motions in two or more alternative locations of controls.

2. Physical limitations of workers. What is the normal and maximum reach of an average worker in a horizontal plane? In a vertical plane? What is his range of "reaction" vision, and of acute vision?

Within the physical limits of the body, there are, of course, a multitude of possible locations and combinations of locations. Before trying to evaluate these on the basis of time required for operation, you should consider several other relevant factors:

. . . Groupings and relative position of controls and meters should follow some pattern or rationale.

. . . Design of individual elements should make for their rapid, positive identification by operators. And where levers, handles, etc., have to be manipulated, the worker must be able to distinguish them by feel as well as by sight.

Turn the page

. . . Where two or more elements are necessarily similar in appearance, they should be separated to prevent confusion and possible misapplication by operator.

. . . If two or more elements have the same optimal position on the basis of all other factors, then the most important and most frequently used should get preferred position.

. . . Where meters or gages must be observed while controls are being manipulated, their relative positions should provide unobstructed vision from the worker's "best" operating position. This same consideration should be given in a situation where the work must be viewed while controls are manipulated.

. . . When two controls are normally to be operated simultaneously, they should be spaced far enough apart within the working area to permit freedom of arm motion and sufficient leverage to operate.

. . . If a crank, wheel, or other rotating-type control is primarily for left-hand use, consider designing it with a counter-clockwise "forward" motion.

. . . Remember that the operator's feet, elbows, and knees can be used to actuate controls when the hands are overloaded.

. . . Whenever possible, the worker should be able to operate (or read) all controls, meters, etc., without leaving the position he occupies while loading, unloading, or positioning the work.

. . . Consider using audible signals on over-run warnings, trip-outs, etc. Although direct-reading meters and indication lights are by far the most common signals on machine tools, it's a fact that people respond 40% faster to audible than to visual signals.

. . . When really sharp vision is called for, remember that when the eyes are fixed on a given point only the main area within 1½ degrees of that point is in clear focus. Only 5 degrees away from that point, sharpness of vision is reduced by 50%.

. . . If you can arrange controls and instruments so that the operator may remain seated (assuming a well-designed, adjustable chair), operator fatigue can obviously be reduced. Since the hip joint of the average erect male is 32 inches above the floor, a seat 30 inches high puts the operator's torso in the same position as standing. But, of course, a chair that high requires a footrest.

How to figure possible savings

We'll assume we're redesigning an existing copying lathe. And we'll assume a part to be turned—in this instance, a forging 12 inches long with four diameters each to be sized in one cut.

Let's analyze only the work elements during part loading and unloading that are affected by control device locations, and the mechanisms activated thereby. Our "new" machine will also out-perform the old on feeds and speeds and other operating characteristics. Those are important in a total evaluation. But remember—we're interested here only in the effect of *location* of controls as they affect loading and unloading.

On our "new" machine, all controls (except spindle change gears) are located on the tool carriage within 26 inches on the horizontal plane and 6 inches on the vertical plane—well within the operator's normal working area.

Moreover, the horizontal center line of the controls is 33 inches from the floor and 12 inches from the operator's body—at the outer range of the normal working area, but well within the maximum.

On the carriage from right to left are a carriage clutch and brake for horizontal traverse, and beside it a lever for feed selection. Above these is a lever for selecting slow, normal, or rapid horizontal traverse. Next group to the left is a hand wheel for setting depth of cut and a lever for rapid tool vertical approach to the work. Above these is a hand wheel for hand travel horizontally.

Finally, at the far left is a hand wheel for adjustment of the tool carriage to the copying slide. At 3½ inches above floor, across front of machine, is a bar that acts as a foot switch for moving the tail stock to and from the work.

Without going into details, we can point out some significant differences in placement of controls on the "old" machine. For instance, the tool carriage moves in a horizontal rather than a vertical plane, so that the distance from operator to spindle is appreciably greater. And the tail center is moved in and out with a hand wheel instead of a foot switch, requiring several extra motions of the hands.

By referring to the Work-Factor tables of "select times" for the loading and unloading operations only, we find that the time for the "old" machine is 0.1606 minute per part. On the new machine it is 0.0838 minute per part.

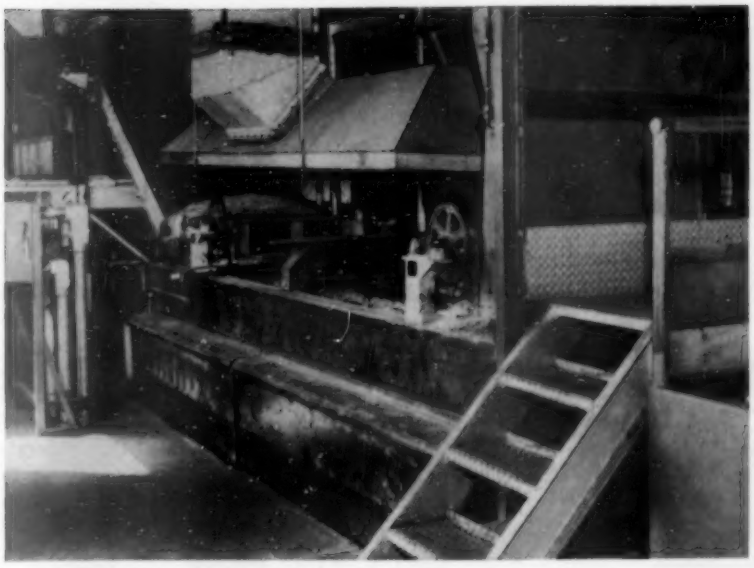
The saving in "select time" is, therefore, 0.0768 minute per part. To convert this to normal operating time under the Work-Factor system, we add to it a "normalizing" factor of, say, 25%, and a "personal, fatigue, and delay" allowance of, say, 20%. This converts the time saving to 0.1114 minute per part.

Obviously, you go on from there to apply this "saving per part" to the annual production rate and determine increase in production.

In the loading and unloading job we've been discussing, relocation of controls would increase production about 3%. If no other changes had been made in the tool and no other parts of the operation were affected, the "saving" would be 3% more production for the same number of dollars of direct labor cost.

Ordinarily, of course, you can calculate the annual dollar saving by pricing out the difference in time per part at the prevailing wage for that type of operator, plus factory overhead (if applicable), and then multiplying by the estimated number of parts per year.

As you make each determination of this type, you can compare the cost of making the change (whether in a tool design or in a workplace) with the direct saving to be made. In addition, you can expect fewer operator errors caused by confusion of controls, resulting in generally better quality, less scrap and rework, and a reduction in breakdowns. In some cases you'll also be able to reduce operator fatigue and required fatigue allowances. And simplify maintenance and servicing.



NO WATCHMAN to check this lead kettle during off-hours. Instead . . .

It's "Remote Supervision" Now

. . . at Signode, Baltimore. Let anything go wrong here — and the "remote supervisor" comes on the double.

SOMETHING NEW has been added to the central-station plant protection service leased by the Signode Steel Strapping plant in Baltimore. It's *remote supervision* of critical plant operations that need around-the-clock checking.

This special service supplements the conventional fire detection and burglar alarm service that many industrial plants use today. It is designed for detection of abnormal conditions that would harm processes, such as too-high or too-low liquid level, temperature, or pressure, and cut-off of heat, power, or other services.

At Signode this service provides a 24-hour automatic check on lead-kettle temperatures, sump levels, and room temperatures. The combined central-station protection systems net Signode $1400 a year in savings after amortization of advance charges for installation of the automatic protection equipment.

Old way—Signode formerly contracted with an outside concern for joint janitorial and watchman service. This required 139 man-hours of labor weekly.

New way—Then Signode looked into automatic protection by central-station service. This involves direct "wire" connections between the plant and the central-station signal-board. This board is monitored constantly by a group of attendants. Whenever any trouble develops in the plant, a signal flashes on the board, alarms sound, and the central station immediately investigates, dispatches armed guards, police, or fire forces when necessary.

For many years central-station organizations have provided automatic fire detection and burglar alarm service in many cities all over the U.S. This has often allowed a user to reduce or even discontinue watchman service. In the case of Signode, the reduction in watchman man-power was calculated to be 59 man-hours, leaving 80 man-hours for janitorial service only.

Yet often, where critical operations exist, a special watchman is still needed around the clock. But not at Signode. It found from ADT (American District Telegraph Company) that it could get industrial process supervisory service in addition to the basic fire detection and burglar alarm services.

Here's how Signode uses this industrial process protection:

Lead Kettles — There are three lead kettles, each containing 50 tons of lead. One kettle is heated by combustion of gas in 20 U-tubes immersed in the lead. The other two are each heated by 50 to 60 electric immersion coils. In all cases the heat is thermostatically controlled to plus or minus 100 degrees of the control temperature.

Freezing of the lead at any time would seriously interrupt production. To assure a quick remedy in case of loss of heat, temperature-controlled devices have been installed that detect any variance beyond the prescribed limits. If this happens they transmit a warning signal to the ADT central station. The station then immediately notifies the subscriber.

Sumps—Cooling water runs at all times into four sumps under the plant floor from cooling coils for:

. . . *Electrodes* in lead kettles.

. . . *Oil-storage tanks* for hydraulic processes.

. . . *Air-conditioning system* in office (summer).

The cooling water comes from municipal supply. It's pumped from sumps into outside drainage ditch.

A fifth sump collects the cooling oil that's skimmed from the rolling mill oil-storage tank. From here the oil is pumped into an outside filtering and settling pond, where the residue is burned periodically.

If a pump failed or power went off, any or all of the sumps would immediately overflow and cause a production shutdown. So Signode has installed pressure-actuated devices on the sumps to detect any increase in liquid level beyond the safety point. At that point a warning signal appears on the ADT central station signalboard.

Heating system—The building is heated by gas space heaters under thermostatic control. Failure of the gas supply or the heater controls would result in a temperature drop that might freeze process water and sprinkler pipes.

So Signode has five thermostatic devices located around the plant to detect any critical drop in room temperature. In such case, a warning signal is received at the ADT central station.

FACTORY | HUMAN RELATIONS

By LESTER R. BITTEL, Industrial Management Editor, FACTORY

Long Vacations Aid Retirement Planning

Here's a fringe benefit that aids the employee—and the company—in getting used to the idea of retirement. Pitney-Bowes, Inc., Stamford, Conn., has an unusual vacation policy: Starting with the 25th year of continuous employment, and every fifth year thereafter, employees get 3 months' paid vacation. This extended period away from his job brings home to the individual worker the drastic problems that prolonged leisure creates. At the same time, it materially assists the company in anticipating the absence of the employee—especially when key men and supervisors are concerned.

On occasion the anniversary vacation has shown up weak spots in the organization. Has uncovered jobs where replacements were inadequate or unavailable. And it serves a management development opportunity for the men who fill in while the old-timers are vacationing.

Middle-Level Engineers

"As manufacturing technology grows more complex, where will we find the technicians needed to back up our trained engineers?" That was the question raised again and again by hard-headed attendees at Pennsylvania State University's Automation Seminar last month. These men, charged with making automation work at their companies, were pointing at the critical shortage of skilled workers at the level between the craftsman and the engineer, and seeking ways to overcome the difficulty.

One of the most popular solutions to this problem today is the training of men and women for an *intermediate* engineering degree. For instance, through its 13 extension centers, Penn State offers a two-year curriculum leading to a degree of Associate in Engineering in drafting and design technology or in electrical technology. Courses are designed to give the student a scientific and general education necessary for immediate employment at specific technical assignments such as technical aides in design, development, and manufacturing.

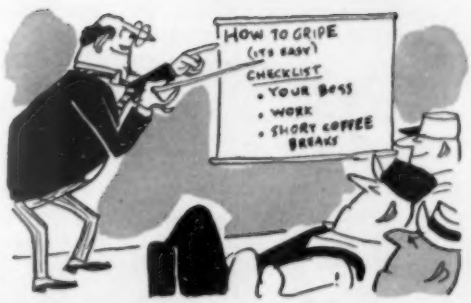
Highland Park Junior College (Mich.), cooperating with Chrysler Corporation, is training people in a two-year course for the degree of Industrial Technician. Chrysler will offer full-time employment to graduates of this part-study, part-work curriculum. They will fill such jobs as laboratory technicians, technical clerks, and draftsmen.

McCoy College of Johns Hopkins University, Baltimore, cooperates with Westinghouse Electric Corporation to train part-time employees for a certificate in Electrical Engineering. They work in the engineering department 32 hours each week. Students receive only technical courses while studying in the three-year course. After getting their certificates they may, on their own, add related liberal art credits to gain a BS degree.

All of which seems to prove that if an employee and his company really want to fill these "middle level" engineering spots, it can be done.

Throw it on the Floor

If you've ever been in a squabble with your accounting people about misplaced inventory tickets, bills of lading, shipping receipts, and the like, here's a tip you can pass on to them. During a recent five-week inventory at Minneapolis-Honeywell Regulator Company, Minneapolis, the chief accountant had the wastepaper baskets removed from clerical offices. All wastepaper was thrown out on the floor. Then later in the evening it was all carefully sorted to make sure it contained no inventory tickets. Result: not one ticket lost or "misplaced." Sounds silly? Maybe. But this sharp break in routine served its purpose.



Tell a Worker How to Gripe?

So much emphasis is placed on training foremen in how to handle grievances that the employee's role in the procedure is often forgotten. But not at P. Lorillard Company. Here each employee gets a booklet that tells him how to handle complaints. It's written from a worker's-eye-view. Tries to show why it's a good thing for all concerned for him to get gripes off his chest. That his foreman is intensely concerned with helping him. Then goes on to explain the orderly process (as agreed in the union contract) for handling a grievance if it can't be resolved between the worker and his immediate foreman or supervisor.

If you'd like to have a copy, write R. B. Wyland, Director of Industrial Relations, P. Lorillard Company, 119 West 40th St., New York 18.

Spin to Win

Looking for ideas on how to sell cost-cutting campaigns to foremen? Then get a copy of "Your Departmental Money-Saver." It's a sort of cardboard roulette wheel designed to get the principles of cost reduction across in popular terms. Each turn of the dial reveals a basic principle of money-saving. Ideas are sound, too. Workers are urged to discuss them with their bosses, fellow-supervisors, and employees. Single copies are available free. Write Research Institute of America, 589 Fifth Ave., New York 17.

Plant Lending Library

Here's a reminder of an employee-recreation idea that's too often overlooked. Lavoie Laboratories, Morganville, N. J., operates a free lending library for its 500 employees. Over 50 workers borrow close to 200 books a year. Library is run as a personnel-department service for less than $300 a year. Membership in best-selling book clubs helps keep costs down.

It seems like a good way to extend your recreation program to people who are not attracted by its more strenuous aspects.

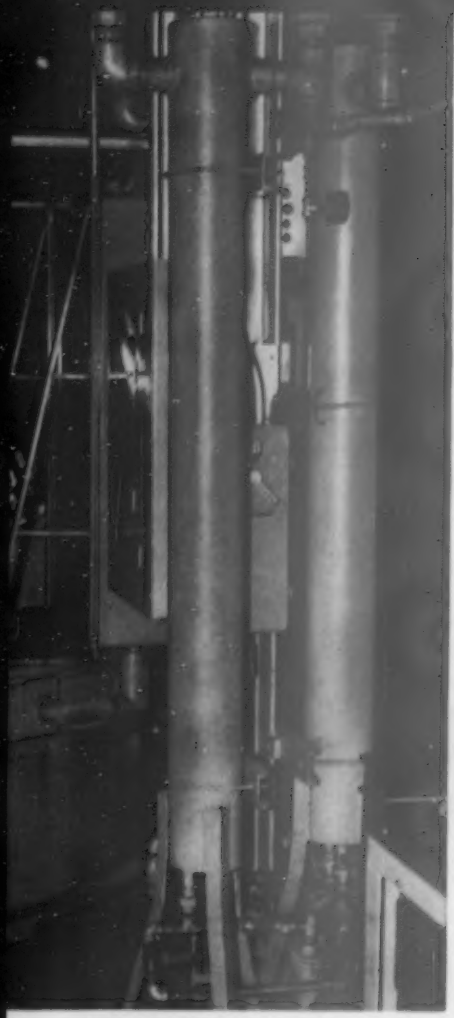
Walking the Plant

So much is written these days about human and labor relations that it's easy for a plant operating executive to get the idea that he can solve all his problems without leaving his desk. If he wants to find out more about executive development, the Industrial Relations Center of the University of Minnesota can furnish him with over 500 references. If the guaranteed annual wage is his oyster, all he need do is write the Cleveland Public Library for a bibliography of 95 publications.

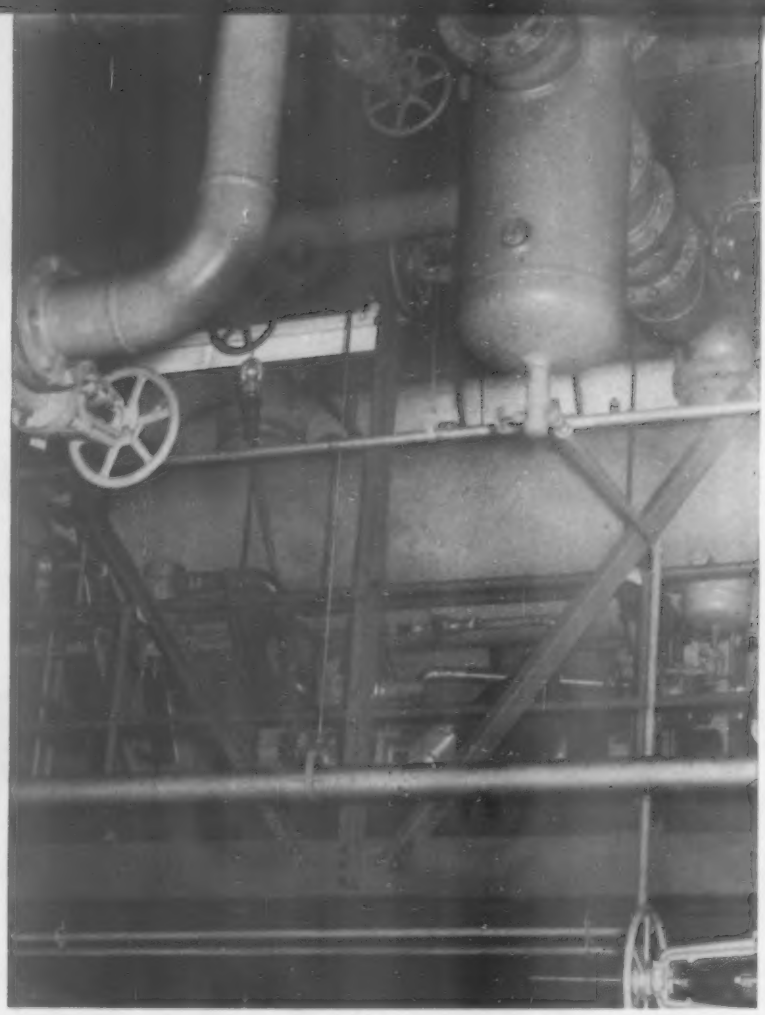
And it's not just an American disease. "Desk Engineers Chided in Soviet" reads a recent headline in the *N. Y. Times*. It quotes a Russian magazine: ". . . A mining graduate, assigned the job of looking for new methods of mining ore, did it on the flat surface of his desk rather than enter the mine."

Trouble with paper research in human affairs is that it does little good for the people in the plant unless they rub up against the boss in every day contact. They want to *see* him around. To feel he's in there pitching with them.

So there's a time to read and to reflect. But also a time to get out into the plant. To forsake the managers' lunch table for a "submarine" sandwich bought from the lunch-wagon. To leave the department aisles for a looksee into the locker rooms. To talk with the sweeper as well as the foreman. To climb onto the catwalk above the boiler and down into the machine pits. To learn about your employees by working with them.



SEPARATORS at points of use remove water from air lines. But can't keep air dry that discharges to lower pressures.



CHILLING proved to be Rochester Products' cure for its wet-air headache. And this self-contained air-chiller unit tucked away in the roof trusses is currently squeezing 95% of the moisture from compressed air leaving the central receiver.

Want Drier Air? Chill It!

How Rochester Products ended a situation that's driving so many plant men nuts. Why a package air chiller looked like the best of six solutions studied.

WET COMPRESSED AIR was our problem. Dripping wet, particularly in the summer months.

Our total load varied from a flow of 1000 cfm. to several times that in any single hour of the day. A central station compressor set-up supplied a plantwide distribution system at 100 psi. But excessive water in the airlines often stalled our intricate automatic machining and assembly operations, or made them erratic. It stopped deburring operations. It caused intolerable corrosion in our steel tubing. Building and process control systems often went haywire. Result: downtime, maintenance, loss of production.

We're on easy street now. But we got there only after convincing ourselves there's no one easy way to solve such a problem. Experiment and experience had to team up to prove to us there's no miracle or cheap way of removing moisture in compressed air. It cost us money. But when the whole score was in, we found that operational savings more than justified the cost.

Original system—The central station compressor set-up at Rochester Products gradually grew over a period of years from one to five reciprocating machines. The first was steam-driven and the four later ones motor-driven — discharging through their respective aftercoolers and

By ALEXANDER BEEBEE
Supervisor of Engineering
Rochester Products Division
General Motors Corp., Rochester

separators to a common manifold. Total capacity was 10,800 cfm. The manifold led out of the compressor house to an air receiver on the roof. From here air was metered and dispatched to the distribution system leading to various building units.

Each compressor and its aftercooler was cooled by a closed cooling-water system consisting of a cooling tower, tank, pump, and necessary piping. The tower design allowed 85-deg. maximum water temperature. The water passed from the tower first through the aftercooler, then to the compressor.

The air distribution piping was designed and installed with the idea of maximum water separation strongly in mind. We followed the well-established principles for adequate sizing of pipe, looping the main for flexibility, and pitching the lines ¼ inch per foot in the direction of flow with proper drips and traps.

This was the system that was causing us trouble.

Traditional cures failed—First we tried the obvious ways to get drier air, because they were easy and not expensive:

. . . We over-designed the aftercooler capacity to wring out more moisture at source. Also kept heat transfer efficiency high by routine cleaning of the water side, and provided excessive water supply.

These steps helped, but didn't solve the problem. All because the tower cooling water could seldom be pushed below 85 F. during the summer. Therefore the aftercooler air discharge would be about 90 F. But as this 90-deg. air cooled off during the evenings it would drop out moisture in the distribution mains, and water would be there for operations in the morning.

. . . We added air-cooling capacity by installing heat exchangers in series with our domestic water service. The compressed air was passed through the other side.

The 70-degree domestic water helped a lot to remove moisture. But this method could not be applied on a plant-wide basis. The air system was about 1000 feet from the water supply.

. . . We provided mechanical separators in the airline to each department to throw out the water just before the point of use. These were built up of 6-in. pipe and baffles with an automatic float trap atttached.

Even these failed to solve the whole problem. They did serve to minimize the slugs during any downtime of air-cooling equipment. Also they proved effective dirt traps whenever internal pipe contamination — dirt and scale — was released by dry air.

Back to fundamentals — Why didn't these measures fill the bill? We found we were asking too much of them in expecting them to cure a fundamental error.

No matter how efficient the separator, the discharge air was bound to be saturated at 90 or even 100 F. because it was sent into the system that way. A more positive approach was needed. This was first to reduce the dewpoint of the compressed air (the temperature at which it begins to deposit moisture as a liquid, no longer carrying it as a vapor), and to remove the condensed water by mechanical separation at the source. Thus saturated air, say at 90 F. and 100 psi., would lose over 60% of its moisture if cooled to 60 F. at 100 psi.

(The moisture contents at both temperatures, at 100 psi., are about 0.26 and 0.1 pounds per 1000 cubic feet respectively. At zero gage pressure they are 2.13 and 0.84 pounds. See "Compressed Air Handbook," McGraw-Hill.)

As every engineer knows, you reduce the dewpoint of compressed air by cooling it. This causes condensation. Yet, if the air is heated later in the pipelines, its vapor content does not increase.

Six ways to cool air—There are more, we know. But these are the methods we examined for the purpose of making our choice. They called for new equipment to cool the compressed air in the main line leaving the air receiver.

. . . 1) Chilled-water aftercooler, direct-expansion type, to cool the air with cold water in a closed-circuit aftercooler. *Equipment:* a pipe-line aftercooler, separator, refrigeration unit and evaporation coil to chill the cooling water, and a water circulating pump.

. . . 2) Chilled-water aftercooler, with barometric condenser, to cool the air with cold water in a closed-circuit aftercooler. *Equipment:* a barometric condenser using an exhaust steam jet booster to cool the water, a pipeline aftercooler, a separator, a cooling tower, and a water circulating pump.

. . . 3) Adsorption of moisture to remove moisture from air by dehydration. *Equipment:* silica gel air dehydration units.

. . . 4) Water-cooled aftercooler, with oversize cooling tower, to replace the existing set-up, similar to it in method of cooling air by water from cooling tower. *Equipment:* pipeline aftercoolers, separators, and automatic traps.

. . . 5) Direct expansion air chiller, built-up type, to cool air directly by refrigeration. *Equipment:* dry-type chiller, refrigeration unit, cooling tower for circulating water in condenser of compressor unit, separator, automatic-trap.

. . . 6) Direct expansion air chiller, unit type, to do same job as (5). *Equipment:* dry-type expansion chiller as a complete package unit, separator, and automatic trap.

Below is our analysis of expected results from these methods.

We found that equipment in item 3 would require more floor space than we had available, meant additional construction. Item 4 was primarily an installation of more efficient equipment to replace that in service. Item 5 required a higher-than-usual refrigeration load because manufacturer would not guarantee proper operation at delivery

	Delivery air temperature, F.	Per cent moisture removal based on inlet conditions 85 F. 90% rh.
1. Chilled-Water Aftercooler	60	95
2. Barometric Condenser	60	95
3. Adsorption Unit	—	100
4. New Aftercoolers	90	78
5. Built-Up Air Chiller	45	96
6. Package Air Chiller	60	95

temperatures higher than the 45 F. stated in table (p. 131). Item 6, although similar in operating principles to item 5, required one-third less refrigeration.

Our new system—On the basis of 95% moisture removal as adequate for our needs, we chose the package air chiller (item 6). Dollar-for-dollar against performance, we calculated it to be the most economical in first cost, installation, and operating costs. It was the only type we could find specifically designed as a self-contained unit for chilling air. It uses F-22 (Freon) as refrigerant.

The fluctuating nature of our load —1-million to 10- or more million cubic feet per day—presented a problem in control. Regulation of a direct-expansion reciprocating freon compressor is difficult to control at an infinite number of load points, from very light to heavy loads. The tendency under light night or weekend conditions might be to shut down the air chiller unit to prevent unnecessary cycling. That would not be good, for moisture conditions are liable to be most severe because of low velocity of air in mains, and cooler ambient conditions around pipelines.

We met this problem by use of a four-step control that operates three-step unloaders from discharge air temperatures. Even then we had to provide a two-speed motor to give a seven-step control. A liquid trap was also placed in the suction line to separate liquid carry-over from the evaporator and from slugging at the compressor.

How well does this new system work? No more complaints. Our original setup has since been enlarged by a 6000-cfm. compressor for a new building. This, too, is equipped with a package air-chiller.

We learned that a distribution system that has conveyed wet air for years may cause some trouble from rust and dirt when transformed to dry air. In the absence of moisture to settle out these contaminants, the particles are liable to blow out with the air. We cured this nuisance at critical locations by temporarily installing filters.

This Is Red Feather Month!

Whatever it's called where you live —Red Feather Campaign, United Fund, Community Chest—it's a good thing for you to share in. Share by giving. Share by working with your neighbors as a volunteer.

And now is the time, because October is traditionally Red Feather Month.

Red Feather is the united way to give. Puts you on the team with 3-million other Americans. Saves you time and trouble. Uses your money where it's needed most. Makes your community a better place to live in. The agencies it supports are at work all year long in 1900 cities and towns throughout the United States and Canada. They're serving children, youth, and your ill and troubled neighbors.

So start now to plan your own part and your plant's role in this year's drive. Need help in planning? Then look at the plans of Fairchild Aircraft (FACTORY, August 1953, page 121) and Warner & Swasey (FACTORY, September 1952, page 104).

Coming: More Grounded Systems

What's behind this trend? Here's expert advice to help you decide between a grounded electrical distribution system and the old standby, an ungrounded one. For every plant operating man. And *must* reading for anyone planning a new plant.

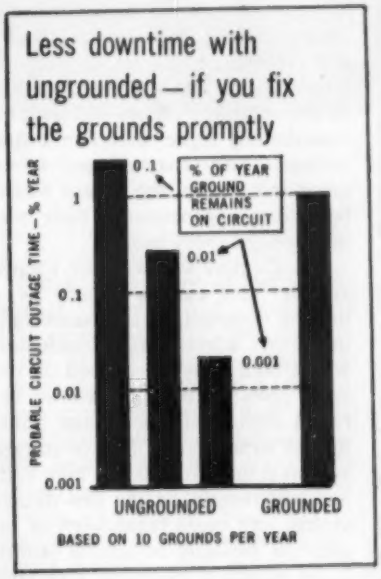
TO GROUND or not to ground? That's a question that has bothered a lot of plant operators. It's not an easy one to answer, because both grounded and ungrounded systems have their advantages. Until recently, ungrounded systems were used almost universally for low-voltage (less than 600 volts) a-c in-plant distribution. Now, however, grounding is generally — though by no means universally — preferred.

Five factors are involved: Outage time, initial cost, safety, overvoltage hazard (resulting in equipment damage), and the problem of locating faults. The popularity of the ungrounded system rests on its advantages on the first two points. The grounded system gets the nod when it comes to the last three. Let's take a careful look at each.

UNGROUNDED SYSTEM — ADVANTAGES

Usually less downtime—A ground on any phase of a grounded system puts you out of action. But a ground fault on one phase of an ungrounded system causes no service interruption. So if you have a reasonably effective maintenance force, you should be able to locate and correct the fault in the next few shifts, with little or no interruption to production.

Effective maintenance is necessary, however, to realize this advantage. A second ground occurring on a different phase before the first fault has been cleared will result in an outage. And the longer a single ground fault is allowed to remain on the system, the greater the likelihood of a second ground occurring. On the chart you can see the effect on total circuit-outage time of the time allowed to elapse before faults on an ungrounded system are cleared. (The chart assumes that every outage on an ungrounded system involves two circuits — which is somewhat pessimistic. But this is partially offset by the assumption that the time an ungrounded circuit is out for repair is the same as for a grounded circuit.)



So, if grounds are removed from an ungrounded system promptly, the number experienced per year must be high before the grounded system shows less outage time than the ungrounded — a big plus for the ungrounded systems.

(This advantage is often canceled out by the common industrial practice of ignoring a ground on an ungrounded system until a second one occurs. The over-all result can well be more numerous and extensive outages than if the system had been grounded.)

It costs less—This benefit is probably over-rated. An ungrounded system does cost less than a grounded one, but the savings are usually small in relation to over-all system cost in any new installation. The cost of grounding an *existing* ungrounded system could be considerable, however, unless there is a readily available neutral point.

GROUNDED SYSTEM— ADVANTAGES

Safer for people — A solidly grounded low-voltage system is probably somewhat less hazardous to personnel than a system that's ungrounded. But this is largely a matter of philosophy, not fact. If maintenance personnel treat all circuits with equal care and respect, the hazard of shock on an *ungrounded* circuit is slightly less than with a grounded one. However, a subconscious tendency to be less careful in working on a normally ungrounded circuit often exists, probably because of a false assumption that any one phase of an ungrounded system can safely be contacted. The knowledge that a circuit is grounded usually results in more careful handling by maintenance men, hence less hazard.

Safer for equipment—Equipment damage caused by overvoltage is less likely. Overvoltages, both transient and sustained, may result in any system, from a variety of causes. But on a grounded system, they're less likely to cause equipment damage.

Here's why grounding is better — for each of the common causes of overvoltage.

. . . Ground faults. When one phase of an ungrounded three-phase system is grounded, a sustained overvoltage occurs: The insulation of the other two phases is subjected to voltages 73% above normal. While the overvoltage seldom approaches the insulation levels of equipment and circuits, the cumulative effect of higher-than-normal voltage stresses may somewhat reduce insulation life. On a grounded-neutral system, phase-to-ground

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Westinghouse Electric Corporation
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MORE GROUNDED SYSTEMS
Begins on page 133

What's the Difference?

The difference, electrically, between a grounded and an ungrounded system is simply this: A grounded system has at least one conductor or point in the system permanently and intentionally connected to ground, either by a solid metallic connection or through some form of current-limiting impedance.

The direct opposite is the ungrounded system, which has no metallic connection normally existing between any current-carrying conductor or point in the system and ground. However, the neutral of an ungrounded three-phase system is normally close to ground potential because of the balanced electrostatic capacitance of each phase conductor to ground.

faults will not result in sustained overvoltage.

Under some conditions, arcing-ground faults on ungrounded systems can produce surge voltages as high as six times the normal line-to-ground voltage. Neutral grounding is effective in reducing such transient voltage build-up by reducing neutral displacement from ground potential and preventing high-frequency oscillation after each arc restrike.

. . . *Normal switching operations.* Generally, overvoltages caused by switching are not more than three times normal voltage, and are of short duration. While grounding is unlikely to reduce overvoltages caused by switching surges, it can distribute the voltage between phases, reducing the possibility of excessive stress on any single phase.

. . . *Lightning strokes.* Most industrial systems are effectively shielded against lightning strokes—by underground location, grounded circuits, adjacent structures, and lightning arresters. Should, however, an overvoltage occur from this cause, neutral grounding would help. While it also would not be likely to reduce overvoltages, it would distribute the voltage between phases, reducing the stress on a single phase.

. . . *Static charge.* Build-up of overvoltage caused by static charge on power-system conductors is not usually a problem in these days of metal-enclosed circuits and equipments. But static charge can be built up on moving parts of equipment, can be transmitted to the power system if motor frames are not properly grounded. And overhead open-wire lines may be subject to static overvoltages under certain atmospheric conditions. A system-ground connection can effectively prevent any such static-voltage buildup.

. . . *Resonant overvoltages.* This applies only to large systems. Through an inductance (such as the coil of a motor-starting contactor), a great amount of capacitance-to-ground can produce a form of circuit resonance during a line-to-ground fault. The voltage-to-ground of the unfaulted phases will then be considerably higher than line-to-line voltage — an overvoltage. In a grounded system, the phases would be held to approximately their normal voltage above ground.

. . . *Contact with a higher-voltage system.* This can be caused by a broken high-voltage conductor falling across a low-voltage conductor, where both lines are carried on the same poles; or by a breakdown between high- and low-voltage transformer windings. If the low-voltage system is ungrounded, the high voltage will remain on the low-voltage system and cause breakdown of insulation, possibly at several points. If the system is grounded, high fault currents will result, but the system neutral will be held close to ground potential, reduce the overvoltages.

Quick fault location — Locating faults on a grounded system is generally fast and easy. On an ungrounded system, however, this is at best a fairly complex problem (see FACTORY, October 1954, page 126); at worst requires de-energizing one feeder after another until the ground detection device indicates the fault has been removed from the system. In a system having properly coordinated over-current devices (such as circuit breakers or fuses), a ground fault should operate only the device nearest to it on the supply side. This, together with the possibility of visual indication of the fault itself, usually makes fault location on the grounded system relatively simple. Since the fault is quickly isolated by the breaker or fuse, the risk of damage to equipment and system caused by a sustaining ground fault is cut sharply.

On the other hand, the arcing and burning sometimes caused by high ground-fault current in the grounded system could bring about extensive damage to circuits and equipment—particularly when the ground occurs between the winding and the core of a motor or generator. The resultant burning of the iron in the core may require complete rebuilding of the unit, instead of a simple rewinding job. But the possibility of this happening on a properly designed low-voltage system, with high-speed over-current devices, is small.

So far, you've seen the "why" behind the trend to grounded systems. For those who decide a grounded system is best for them, there's a companion problem: How to ground.

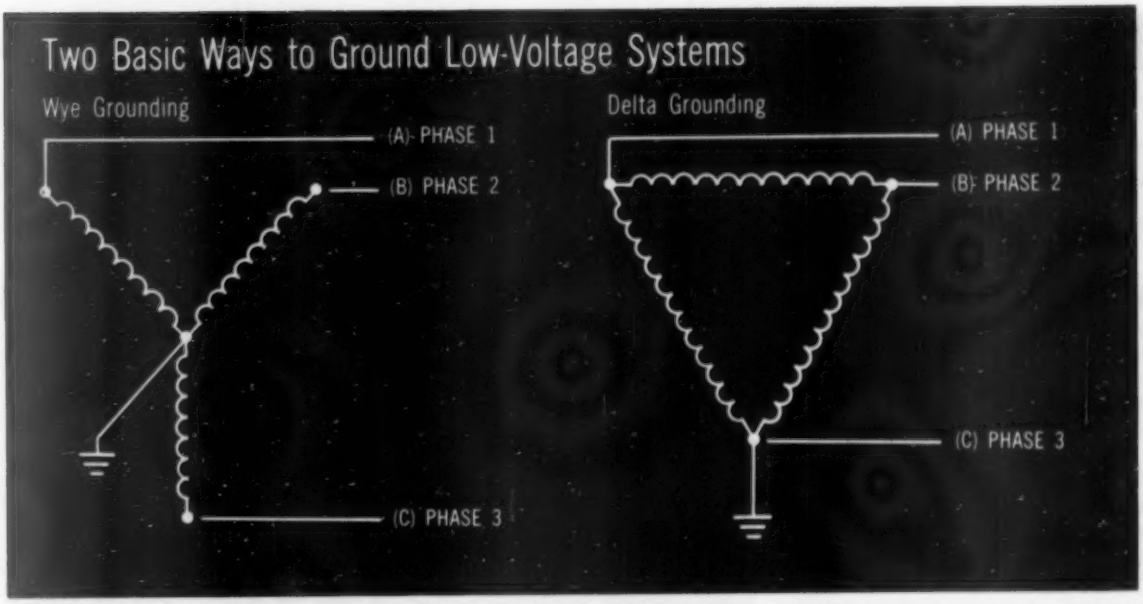
What's the best grounding system?

Assuming you decide on a grounded system, should it be grounded solidly, or through an impedance? And which is better—wye grounding or delta grounding? Again, as in the previous questions we've explored, there are advantages on both sides. Let's take a look at the pros and cons.

SOLID GROUNDING GENERALLY BEST

Low-voltage systems are generally grounded solidly—that is, with no intentional impedance in the ground connection. Why? Only with solid grounding do you get sufficient ground-fault current to operate over-current protective devices (breakers, fuses). Circuit breakers, operated by self-contained series trip coils, require relatively high values of fault current in order to recognize a ground fault. And even a small value of grounding impedance is likely to reduce the fault current below the trip setting of the circuit protective device, eliminate the protection it's designed to give.

Exception to this rule: When the neutral of a generator is grounded solidly. The phase-to-ground fault



GROUNDED-WYE system costs a little more than the grounded-delta, but it generally gets the nod when a new system is being set up. Reason: Lower voltage between phases and ground means fewer insulation failures.

current from a generator is likely to be greater than the current for which the generator windings are mechanically braced. The generator neutral should then be grounded through an impedance sufficient to limit the ground fault current to a safe value.

WYE VS. DELTA

There are two basic methods of grounding low-voltage systems:

. . . Connect the secondary sides of the power center transformer in wye, bringing out and grounding the neutral point at each power center (see left of drawing above).

. . . Ground one phase or one corner of the delta-connected power-center secondaries (at right above).

Wye system has advantages — Phase conductors (A, B, C, on right of the drawing) normally operate at equal voltage above ground. These voltages are less than the line-to-line voltage (A to B, B to C, C to A), and less than the voltage-to-ground from two of the phase conductors (A or B to ground, right of drawing) when one corner of a delta system is grounded. This is particularly significant in 575-volt circuits where conductor insulation must work at practically full-rated voltage in grounded-delta circuits. The lower voltage stress to ground in the grounded-wye system probably decreases the number of insulation failures in mains and devices on 575- and 460-volt circuits

But it costs more—Chief disadvantage is that it costs more than delta grounding. That's because protective devices in the grounded-wye system should be equipped with an over-current element in each phase to recognize all ground-fault conditions. More expensive motor-control devices may be required, but present practice is to provide three overcurrent elements in all low-voltage air-circuit breakers. And transformers for grounded-wye service on the low-voltage side cost from one-and-a-half to six per cent more than delta-connected transformers.

It's not usually necessary to carry the neutral wire along with the three-phase circuit unless the circuit supplies single-phase loads connected from line-to-neutral, as in 120/208-volt circuits with a 120-volt lighting load. Therefore, there may be no additional circuit cost to charge against the wye system.

The additional costs of grounded-wye transformers and controls with three overcurrent elements are appreciable when compared with the cost of delta units; but relatively small when considered as part of the total system cost.

Wye—for new systems—In recent years a substantial percentage of industrial secondary substation transformers for new plant installations have been purchased with wye-connected, low-voltage windings suitable for neutral grounding. These transformers offer the advantage of being applicable to an existing ungrounded system while having a neutral available for grounding if desired at some future time. The small additional cost of the grounded-wye transformer can generally be justified in new systems.

Delta—for existing systems — If the transformers of existing systems have their secondaries wye-connected with the neutral point available outside the tank, there will be little trouble or expense involved when changing to a grounded-wye system. But since this is not generally the case for existing ungrounded systems, it is usually easier and cheaper to ground one phase and operate grounded-delta.

To obtain a neutral point for grounded-wye operation when the secondary substation transformers are delta-connected, a grounded transformer is generally used. The transformer windings are connected either in a wye-delta or zig-zag arrangement, so that they don't carry load current, but serve as a source of ground-fault current. Grounding transformers for low-voltage systems must be relatively large in order to carry ground fault current necessary to operate low-voltage protective devices.

How to Beat Winter Weather

Zero days are just ahead. They'll slow down your production and bring more accidents—unless you get ready for them now. So here are the cold facts about winter chills—how they'll hurt your workers and what you can do about them.

IF YOU DON'T know the facts about cold weather and cold working conditions, better learn them now. And better get your plant—and your workers—ready for winter. It's just around the corner.

Sure, heat brings more troubles among workers and in plants than cold does (FACTORY, June 1955, p. 102). But intense cold brings its share of grief, too. It strikes at your yard gang, the men who work on exposed shipping docks, outside maintenance men—any of your employees who are exposed to extremes of weather. And it affects—all year long—the men who have to work in your cold storage plant, your refrigerated testing room.

How does cold hurt? Well, it . . .

. . . *Slows output,* because your workers use up a lot of energy just in keeping warm—energy you'd rather have them put into their work.

. . . *Increases accidents,* because it numbs fingers and brains, brings on mental confusion and loss of manual dexterity.

The table below shows one way in which extreme cold affects workers—cuts their efficiency and makes them accident-prone. The table tells how long a man can last in subfreezing temperature before he begins to shiver violently—and before his finger or toe temperatures drop below 55 F. The figures below assume that he's dressed in heavy Arctic clothing, boots, and mittens, and that he's doing light, sedentary work. Here are the data:

HOW LONG IT TAKES TO SHIVER

Temperature (Degrees F.)	Time to Shivering (Hours)
10	6.0
0	5.0
–10	4.0
–20	2.5
–30	2.0
–40	1.5
–70	0.4

Watch out for these "cold" diseases

Healthy persons, used to cold, don't suffer much in their daily work if they keep hands, feet, ears, and nose warm by wearing proper clothing and rewarming themselves periodically. But the people who chill easily show up fast. Not only with neuralgia, muscular pains, rheumatic complaints (all intensified by temperature changes, drafts, dampness.) But also with the following "cold" diseases, all of which are uncomfortable, to say the least:

. . . *Chilblain,* caused by rapid rewarming of the extremities after repeated exposure to cold.

. . . *Trenchfoot,* caused by reduced circulation brought on by inactivity and prolonged exposure to wet conditions at near-freezing temperatures.

. . . *Frostbite,* resulting from exposure to air temperatures less than 25 F., at which point the flesh freezes. Frostbite affects fingers, toes, ears, nose, cheeks.

. . . *Dry skin, nasal mucosa,* both come from repeated exposure to cold. Nasal mucosa is similar to rhinitis caused by moist heat.

. . . *Influenza, pneumonia,* which are the most common respiratory diseases (except the ordinary "common" cold) that strike workers who are exposed to cold conditions. Basic cause is sudden temperature changes that lower a man's usual resistance to infection.

But workers needn't suffer—Not if you take precautions, guard them against the effects of intense cold. Here's what you can do:

. . . *Select the right employees* and protect their health. This is just as important for cold jobs as for hot ones.

. . . *Provide proper clothing* for your workers. But bear in mind that boots and gloves with artificial heating are necessary to keep extremities warm in sub-zero weather. And for temperatures colder than 50 below zero, better provide a full-face mask to cover eyes, ears, nose, and mouth. Also, be sure to correlate low-temperature clothing with temperature and activity. Overdressing brings on heavy perspiration during work, subsequent chilling during rest periods in cold. So provide clothing with slide fasteners—or some other means of opening and closing. Open clothing will prevent accumulation of sweat during work. Zippered-up clothing will avoid chilling during rest periods.

. . . *Set up rewarming periods,* alternate them with exposure to cold. Treat acute, accidental chilling with a hot (90 to 100 F.) shower. It will shorten any suffering from shaking chills. And it'll take less time than warming in air, which requires several hours regardless of the height of the air temperature.

. . . *Provide suitable dressing rooms,* showers, rest areas. They're essential for workers in cold areas.

Another way to beat winter cold—Turn back to page 88. There you'll read how one plant in a cold climate captures waste heat from exhaust fumes, uses it to warm incoming air that's fresh but frigid. Keeps workers happy, knocks the top off fuel costs.

HOT PAINT, drawn by spray gun from "Y" joint (arrow) in circulating line, cuts painting and curing cycle almost in half for Reo. Paint is heated by electric coils.

Switching to Hot-Spray Paint...

... gives the heavy coat Reo wants on truck parts. And savings that make the dollar-watchers happy.

HEAVIER PAINT coats on sheet-metal truck parts and assemblies. That's what Reo Motors, Inc. (Lansing, Mich.), wanted.

One way: Extend painting cycle with longer booths, slower conveyors. But that wasn't Reo's way. Would have cost about $30,000, shut down painting for two weeks.

Reo went to hot spray instead (photo above). Why? Because heat speeds flow from guns — cuts viscosity, acts as thinner, delivers twice as much paint per second.

Benefits? — Take a look:

... *Paint coat twice as thick.* Used to be about 1 mil thick. Now it's 2 to 2.8 mils. Smoother and glossier, too. And imperfections are better covered because there's less paint shrinkage.

... *Painting and curing cycle cut* from 5½ to 3 hours. Speed of conveyor that carries parts and assemblies through booths and curing ovens jumped 46% — from 56 to 82 inches a minute. Spacing between hangers dropped from 24 to 16 inches. Oven time fell 20%, curing temperature dropped from 330 to 250 F. (You need less heat to bake enamel that's already hot when it's applied, says Floyd G. Schwartz, manufacturing superintendent.)

... *Labor costs slashed* $40,000 a year. Reo eliminated an 8-man night shift on spray painting, saved $36,000. And lopped off another $4000 by eliminating need for thinner. (Mixing thinner and paint used to be a full-time job for one man.) Labor savings alone paid for the hot-spray equipment in less than three months.

... *Thinner cost cut* $800 a year.

... *No more stoppages* caused by clogged lines. On cold mornings, paint used to congeal in the lines. Usual practice was to add thinner. Later, as plant warmed up, paint flowed too freely. Result: "sagging" — and lots of rejects. But that's no longer a problem. Downtime reduction is "at least 20%."

... *Working conditions improved.* Hot spray requires less atomizing pressure. Result: less overspray, less fog in the booths.

Set-up for hot spray — Two operators in each of three booths spray a primer coat and two color coats on truck components. Heater racks are mounted on outside walls of the booths. In the primer booth, two heaters serve each operator. One heater holds the primer that's used on commercial vehicles; the other, primer for military vehicles. Four heaters serve each color-booth operator. Each contains one of Reo's four basic colors — red, orange, green, gray.

No delays in changing colors. Switching is a 3- to 5-min. job To avoid even that much downtime, switch is made in one heater while the operator draws paint from another. Paint men follow the day's production schedule in changing colors. To switch colors, hose between agitator and heater is disconnected at agitator. Next, gun is triggered to draw off excess paint in heater. Pneumatic hose cleaner forces solvent through hose, pump, heater coils, circulating line, and spray-gun line. When clear solvent comes from gun, system is clean.

Paint is stirred in a pressure agitator, then moved through rubber hose to an air-powered heater pump — part of heater assembly Pump circulates paint continuously — through heater, out through line in booth, back through heater. Squeezing trigger draws paint off circulating line at "Y" joint.

Inside heater, paint passes through electrically heated copper coils, is brought to 160 F. Atomization through gun cuts this to about 100 F. Conduit with sealed connection takes power for each heater off plant's 110-volt lines. Pumps are connected to plant's air lines. Gage on each heater shows fluid pressure, paint temperature. Heater units are controlled from a simple, centrally located panel.

Making Your Plant Paper Pay Off

Is your plant paper really working for you? You'll want to take a hard look at it when you see how Du Pont makes its employee publications pay back what they cost.

A SPOON as big as a scoop shovel —that's what U. S. industrial management used last year to dish out many millions of dollars to nourish a growing family of more than 10,000 employee publications.

Yet many management men are painfully aware of the need for vastly improved communications with employees. They ask themselves a single, jarring question: "Is management getting its money's worth?"

Sure, they say, no management today can afford the luxury of ignoring the employee's legitimate appetite for information. Experience has shown that no company can hope to operate efficiently without the loyal and enthusiastic support of its employees.

But the question is not whether a publication communicates. It obviously does. The question is: Does it communicate anything worth hearing? Are we using our publications to maximum effectiveness? Are we getting our money's worth?

To the objective gaze, one fact generally emerges: This mountain of paper—from slick picture magazines to mimeographed throw-aways —brings forth mostly mice. In a time when management's ardor for better communications is at crescendo, it's surprising how softly its house organs speak. In the industrial symphony they are like the harps, playing minor themes in muted tones that employees will never hear.

Two reasons why—A publication should be an integral part of any employee relations program because . . .

. . . *You need a voice.* Management's need for effective expression is immense. The necessity for management to speak up for itself is not waning but waxing.

. . . *Everybody reads it.* Editors and supervisors alike cite a varied body of evidence to prove that most employees read everything in their plant publications.

As awareness that employees want information deepened, many managements discovered at first hand the tremendous capacity of their publications to "get through" to employees with important messages that influence conduct. Generally these companies have relegated drivel and gossip to minor roles in the publication. They have found, sometimes to their surprise, that employees want and seek information — not about Mamie's garter, but about how the plant operates. In these companies, employee publications are truly becoming management instruments.

Nine ways to use your plant paper

To employee relations men, instances of good results are evidence of a paramount fact: Management has only begun to scratch the surface of what it can do with employee publications. It is just beginning to realize their potential.

The biggest problem faced by employee publications does not sound like a problem—management is too easily satisfied. It is usually content with what it is getting. A four-color picture may be mistaken for a good publication.

Too seldom does management advance root-and-branch criticism that asks, "What are we trying to do with this publication? What are our goals? Are we getting our money's worth? How can we improve it?"

Our experience at E. I. du Pont de Nemours & Company, Inc., suggests a variety of ways in which plant publications can be used as channels to disseminate information of great value in the daily operation of a plant. Du Pont's publications are edited locally at plants of all sizes in all parts of the country. We can report uniformly good results when our papers are used systematically to buttress the oral communications of the line organization.

Following is a random sampling of the kinds of messages that the publications have imparted — messages dealing with problems familiar to every plant management:

1. Cost reduction—In a 1300-man cellophane plant, a study indicated that power consumption could be substantially reduced. Management used the employee publication to spearhead a plant-wide power-savings program. In issue after issue, stories and pictures described to employees the cost of power per man, the estimated saving it was possible to achieve. Specific ways were listed by which employees could conserve steam, heat, water, electricity, and brine. Suggestions were encouraged.

. . . *Results:* Number of suggestions received was double that for the same quarter in the preceding year. Many were power-conservation suggestions. A number specifically mentioned the stories in the plant paper. In conversations with employees, supervisors frequently got a playback of facts from the paper. Management, praising the role of the paper in stimulating interest in the campaign, estimates power savings for the year at $100,000.

2. Rumor prevention — When steps were taken to modernize a routine process in a 3000-man chemicals plant, many rumors began to circulate. "This conversion," they ran, "might cost a lot of us our jobs. It may call for fewer men." Meeting speculation head-on, the management and the editor prepared a factual report on expected accomplishments from conversion, time to completion, and effect on personnel.

By WILLIAM C. HALLEY
Plant Publications Service
E. I. du Pont de Nemours & Company
Wilmington, Del.

. . . *Results:* Supervision reported that rumors and speculations dropped rapidly after the facts were published in the plant paper.

3. Community relations — At a 2500-employee textile plant in a small southern town, adequate waste disposal posed a continuing management problem. A process utilizing a new raw material was instituted. Stream pollution was sharply reduced. Using its plant paper, management prepared a feature story describing its anti-pollution efforts, pointing out that river waste had been cut 75% in five years.

. . . *Results:* Supervision reported widespread interest and favorable comment by employees. In addition, local newspapers picked up and ran the story of management effort. They applauded "what an industry can do when it wants to be a good neighbor."

4. Cafeteria cost—One 3000-employee plant faced a perennial industrial problem: Supervisors reported considerable comment to the effect that the price of food in the cafeteria was too high. Actually the cafeteria was a rent-free service that set out merely to break even. To counteract speculation, management prepared a story showing a complete breakdown of the cafeteria's income dollar, of which the high wages of cafeteria employees took a large slice. The story showed that the plant was spending $1.02 for each dollar of receipts—and that the loss was due to low volume.

. . . *Results:* Supervision reported general disappearance of speculation that the plant was "making money" on the cafeteria.

5. Selling personnel plans—Management had long since instituted a series of group insurance and hospitalization plans that were paid for largely by the company. Yet a constant problem was faced in keeping employee participation up to required levels. The problem was especially acute in a new 2000-man southern plant. The average operator was in his early 20's and had little interest in insurance of any kind. To help meet this problem, management launched a concentrated education and orientation program on the insurance plans through the plant paper. Each plan and its advantages to the individual were charted in detail.

. . . *Results:* Required levels of employee participation in the plans were reached and maintained without difficulty. The industrial relations supervisor called the plant's performance "a concrete result" of the paper's stories.

6. Personnel problems—One textile plant's experience, typical of hundreds of others, documents the power of a publication to build morale through recognition of employee achievement. Mary was a problem case. Though a good operator, she sowed dissension and "kept the girls in an uproar," her supervisor said. The supervisor and the editor dug into Mary's life and found she was a good amateur photographer. Her achievement was recognized in a story in the plant paper.

. . . *Results:* Her supervisor says, "You wouldn't believe the change. She even smiles."

7. Safety shoes — Encouraging employees to wear proper protective equipment, like goggles and safety shoes, is a continuing job in most plants. One plant with 1300 employees began a safety shoe campaign in the plant paper by publishing a picture of a new safety shoe available at the plant stores.

. . . *Results:* In two weeks, stores sold 50 pairs of the new-style safety shoes. Employees arriving at stores frequently asked to see "those shoes they showed in the paper."

8. Conservation of supplies — In a 2000-man textile plant, a series of articles was run to draw attention to waste of operating supplies. Featuring a number of items, the article included charts on current consumption and forecast possible savings over the next six months. Appeal was made for employee cooperation. Six months later, the editors announced the following:

. . . *Results:* The actual savings realized on safety glasses, $2000; textile scissors, $400; flashlights, $450; paper towels, $500; and automatic pencils, $164.

9. Keen business competition — A 3500-man chemicals plant was entering a vigorously competitive era on the market. New competing plants developed by several producers of a similar product were expected to put an extra premium on quality. To dramatize the situation for employees and to enlist their cooperation, management worked with the plant editor on a story. It pointed out that competition was becoming stiffer, and presented a complete picture of what the situation would demand of each employee in the plant.

. . . *Results:* The story received widespread attention and comment. Supervisors reported a large number of queries and suggestions for improved efficiency.

How NOT to use your plant paper

What happens when a publication has no goals? Or when, after paying for it, management holds it at arm's length? Here are four cases in point:

. . . *A venerable plant, depressed for the first time in its history.* Management is doing all in its power to prevent layoffs. At the same time that it is spending money on a new competitive process, it is also spending money on pollution abatement measures. Meanwhile, a representative issue of its paper devotes 35% of its space to personals, 30% to service anniversaries and retirements, and the remainder to sports, "Hobbies Are Good for You," and community fund drives.

There may be no question that employees skim such fare. It's local, and as significant as the fact that the town barber has added an extra chair. The real questions are two: Can management afford to foot the bill for these trivia? Do employees respect a pollyanna publication that never really gets down to brass tacks?

. . . *A plant where fire destroyed an operation employing several hundred operators.* All were absorbed into the organization until the facilities were rebuilt. No mention of this fact is made, but there is a whale of a story on a fishing trip to Canada.

It's a misconception to believe that the reader will never notice that his editorial diet is light, or that he will be content with a superficial picture of his plant life. The fact probably is that a superficial story merely spurs speculation along the lines of "I wonder what the real truth is."

. . . *"The Invisible Stack" case.* In the center of this plant, along the route to the main gate, a 125-ft. brick stack was constructed. The

MAKING YOUR PLANT PAPER PAY OFF . . . *Begins on page 138*

editor proposed a factual story telling employees the purpose of the stack. "No," his boss said, "that's a fume stack. We don't want to attract attention to it."

. . . *The layoff problem.* Here's another obvious subject that some managements decline to treat. One company had the unexpressed hope that if no problem is acknowledged, no problem exists. Yet it knows that in a few hours everybody in a community will learn there has been a layoff. The local newspapers call. Employees are speculating from pump house to powder rooms. At this time of all times, the employee wants to know, "How is this going to affect me?" But to his astonishment, when the plant paper appears, it does not mention the layoff—now the paramount fact of life for the plant employee.

Who will tell *your* story? In answer to this you should just ask yourself: Who is to take management's place in explaining the circumstances that necessitate a layoff? The union? The employee who is laid off? The employee worried about being laid off? The community women's club? Not likely.

Similarly, if management will not describe its efforts to abate pollution, who will? Certainly not the irate housewife whose wash is spotted, nor the Izaak Walton League, nor the newspaper seeking a sensational story for its readers. The job is right in your own lap.

How to get your money's worth

What can you do to improve the content and effectiveness of your employee publications? How are they to be made management instruments — communications tools? What your paper needs is . . .

. . . *Your conviction that the publication should constantly improve,* that management should get more for its money.

. . . *A new look, not only at the publication but also at the desires and motivations of management.* Why do you have a publication? If the motive is social approval, would the money be better spent on a girls' softball team? If, on the other hand, the publication's objective is to communicate, is the information it is disseminating worth the money?

. . . *Good editing.* Those who have watched employee publications develop, know there is no substitute for the imagination, judgment, and skill of a man trained for his job. The tendency, when starting a publication, has been to find a personnel assistant who once wrote a column for his school paper, or to select a stenographer who is up-to-date on This-and-That-Around-the-Plant. But the big and noticeable improvements have come when managements have finally decided that the way to get a good paper is to hire a good editor.

. . . *Active management support.* The editor, however qualified, cannot go it alone and do other than a superficial job. In many plants he is so far from top management that he could not be heard if he shouted. To end the editor's oft-heard plaint that he is working alone, management should take him into its confidence, consult him on ways he can assist with a problem. If he is not worthy of such confidence, he should not be the editor.

It is extremely likely that when management subjects publications to the searching analysis it devotes to a production job, other publications problems will become details. Better editing and organization support will come naturally.

YOU BE THE ARBITRATOR

Out of the experience of the American Arbitration Association

THE CASE OF

The Guaranteed Call-in-Pay

Steve B., a crane follower in a foundry, was ordered to report for work one day when there was nothing for him to do. He was sent home, credited with four hours' call-in pay, in accordance with the union contract. But the next week the personnel manager found that the boner was more complicated than he thought. It seemed that Steve shouldn't have been called in even if there *had* been work. Joe K. had more seniority in that classification. As a result, the union filed a grievance in Joe's behalf, demanding four hours' pay.

"There was no work to be done and nobody worked," answered the personnel manager. "Call-in pay is given to an employee to compensate him for the inconvenience of coming in when there is nothing to do. We paid the only man who was inconvenienced by our mistake, and we shouldn't be made to pay for it twice."

"You made not one mistake, but two," replied the shop steward, "so you should pay for it twice."

Eventually this case went to arbitration. If *you* were the arbitrator, how would you decide?

For the actual decision, turn to page 244.

CARTON OF GASKETING, with top and sides removed, rides roller conveyor to press operators, who peel off gasketing strips, pierce them. Gasketing then drops into aluminum tray on ball-top conveyor. Filled tray is pushed under press and onto wheel conveyors, carried sideways to notching and cutting press.

GASKET STRIPS, notched and cut to length on press (left), are loaded on saddle-like hangers. Chain conveyor with moving hangers (right) carries strips to fusing station and final notching in a small air press. Fused gaskets, shaped to fit refrigerator door, are stored on dolly racks designed to hold them in shape.

Trimming Unit Costs 14%

Handy-dandy new carton (right) and conveyorized fabrication (above) team up to knock the top off costs.

WHY PAY packing and shipping charges for cartons that contain a lot of air along with the items you buy? Westinghouse Electric Corporation, Columbus, asked that question — then switched from the old package shown in the small photo (right) to the new one (left).

Takes only a glance to see the new package makes sense. But the picture doesn't show how the change led to a 14% cut in the cost of door gaskets for refrigerators. Here's the before-and-after story:

Old way — Bought complete gaskets from suppliers. Because of the material (extruded vinyl plastic), gaskets had to be shipped and delivered in a carton that held them in the shape of a refrigerator door. Carton 53 inches long, 29 inches wide, 10 inches deep, held only 20 gaskets — 770 cubic inches of carton space per gasket. And shipping cost per gasket was high. What's more, cartons were costly to store, posed handling problems along the production line.

New way — Westinghouse buys straight strips of extruded gasketing, fabricates its own gaskets. Carton 41 inches square, 17 inches deep, holds enough gasketing for 360 refrigerator doors. Shipping cost per gasket has been cut 70%, lowering over-all gasket cost by 5½%. An additional 8½% has been knocked off over-all cost by doing the job formerly done by suppliers — piercing, notching, cutting, and fusing extruded strips. Cut-off ends that are too short to be used are sold back to the supplier.

Savings will pay for new fabricating and handling equipment in 8 months. For a quick look at new operation, scan the photos.

NEW CARTON (left) is loaded with gasketing strips instead of finished gaskets (right), cut shipping costs 70%.

How the New Reserve Law Hits Young Plant Workers

Men inducted before Aug. 9 have an 8-year military obligation, even though they"re not compelled to take Ready Reserve training. If they've had 2 years' active duty, for example, they'll be kept on the books of the Ready Reserve for six more years. But they can eventually transfer to the Standby Reserve by taking part in organized training.

As the program stands now, a young man registers with his draft board at 18, is subject to induction at 18½. The program holds to the idea that every able young man must serve time.

But he can take a variety of routes to get there:

... Enlist prior to 18½ for 6 months' active duty—primarily in the Army—spend 7½ years in the Ready Reserve. There's a ceiling of 250,000 men per year in this program. If not high-school graduates, these men will be deferred from active service until they finish school or reach 20.

... Enlist for 4 years or more of active duty in any service, then spend 1 year in Ready Reserve, another in Standby Reserve.

... Enlist for 2 years' active duty in Army, spend 3 years in Ready Reserve, 1 year in Standby Reserve.

... Enlist for 6 years in the Navy Ready Reserve, be subject to call to 2 years of active duty sometime within 2 years of enlistment date.

... Enlist prior to 18½ in a National Guard or Ready Reserve unit, do weekly drills and summer camp training until 28. No active duty required. But he can volunteer for 6 months' active service to reduce the term of enlistment from at least 10 years to 8.

... Enroll in a college and join ROTC. This guarantees deferment until graduation. If he completes ROTC, he'll be commissioned in the reserve at graduation. Each year, the services will determine how many ROTC men to put on active duty for 2 years, followed by 3 years in the Ready Reserve and 1 year in the Standby Reserve. Those not called to 2 years' active service will spend 6 months on active duty for more training and up to 7½ years in the Ready Reserve.

... Wait to be drafted for 2 years' active duty, followed by 3 years in the Ready Reserve and 1 year in the Standby. When called, he can be deferred for two 6-month periods if he holds a critical job in an essential industry or if he's satisfactorily attending college.

Theoretically, he can avoid active service by sweating out the draft. Based on the 2,850,000-man active force planned by the administration —and okayed by Congress—for upcoming years, we've actually got more men than we can use.

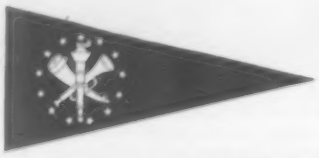
Reservists — Your Newest Worry

The new Defense Law will spell trouble for you unless you know how it hits your workers, what you can do. Here are the facts — straight from the Pentagon.

FOR THE FIRST TIME since World War II, plant operating executives can see light in the muddled military manpower picture.

From here on out, you should have a better idea of your employees' military obligations. You'll know, for instance, which men you can expect to lose first in a national emergency, which men will be allowed to stay on the job. And you'll be able to seek assignment of your most essential men to a special category — Standby Reserve — from which they will be less likely to be called to active military service.

All this stems from the Reserve Forces Act of 1955, signed Aug. 9 by President Eisenhower. The new law doesn't set up an entirely new reserve system. It simply clarifies—and puts teeth into—two statutes that are the heart of our military manpower program: The Armed Forces Reserve Act of 1952 and the Universal Military Training and Service Act (the Draft Law).



NEW TRUE-BLUE PENNANT will fly over plants where Defense Department finds exemplary military leave policies.

New problems ahead—But the new law also creates some future problems for employers. First off, it makes reserve training compulsory —after completion of active duty —for most men inducted after Aug. 9. This means: 1) attending drill 48 nights a year plus up to 17 days at summer training camp, or 2) a maximum of 30 continuous days of active duty for training during the year. Reservists who fail to take part in either plan will be drafted for 45 days' continuous service that year. Employers are expected to make it as easy as possible for reservists to discharge this training obligation.

Up to now, a few of your employees may have participated voluntarily in National Guard or Organized Reserve Training. From now on, the number will be much larger.

This brings up a host of personnel questions. Most important: Should men required to take two weeks of military field training each

By MORTON A. REICHEK
McGraw-Hill Washington News Bureau

year have to do this during paid vacations? Or will you give them extra time off? (A study of 329 companies just completed by the Associated Industries of Cleveland showed that 230 companies grant leave without pay; 53 insist that leave be taken in vacation time; only 22 grant time off and make up the difference between regular and service pay. Four give time off *with* $5 per day allowance for two weeks.)

Other questions: Will you—and your union — make concessions about overtime and night work assignments for reservists? Young employees with little seniority are usually the ones hit with the least attractive shifts—just the ones that might interfere with drills. You'll also have to decide whether it's worth the risk to train young workers in difficult skills, only to lose them for extended periods of military service. Such questions as the above are sure to loom big in upcoming collective bargaining.

And if you think you've got problems, then look at those confronting your employees. They've got to decide among a fistful of options (see box on facing page—and note details in the law itself). Not easy.

Two kinds of reserves—"Ready" and "Standby." Here's how they're made up:

. . . Ready Reservists must continue training after they finish active service (except those inducted before Aug. 9). Objecive is to build a Ready Reserve of 2,900,000 by 1959, though most experts think this can't be achieved until 1962. These reservists will be in trained, organized units, ready to back up active forces during first phase of a war. At present 700,000 are in the Ready Reserve—many to be screened out soon. Ready Reservists are subject to recall in a national emergency proclaimed by the President. But the President would need Congressional authorization to call up more than 1,000,000. Pentagon schedules show that Air Force Ready Reservists would be called within 30 days of a Presidential Declaration of National Emergency, Navy 3 months, and Army and Marine Corps 6 months.

. . . Standby Reservists are those still covered by military obligation but exempt from training. They are subject to recall during secondary phases of any general mobilization ordered by Congress. They would be called back by local draft boards, which would defer reservists in essential jobs. Standby Reserve ranks will be continually increased by men completing reserve training requirements or screened out of Ready Reserve units because they have critical skills more valuable to defense industries than to the military, or have many dependents. Objective is to build up a Standby Reserve of 2,000,000.

Manpower supply—Right now, active forces take 300,000 men a year through voluntary enlistments. About 850,000 men reach 18 each year. This leaves 550,000 subject to draft. Because of size limits for the military, calls are now down to about 120,000 annually. This means about 430,000 men can sit on their hands awaiting draft.

Young men are subject to draft until 26. Average age of induction now is 22. Within four years, average age will be up to 24. If a man reaches 27 and has not been inducted, he's no longer subject to draft. If he has sought deferment, however, he is liable to draft until 35. Therefore, the status of employees who want to sit back and wait for the draft remains a question mark.

Employer's responsibility — By law he's required to reemploy all men who go on active military service—whether for two weeks or two years—assuming the man applies for reemployment within 30 days after completing active service. An employee has recourse to civil action against an employer who refuses to rehire him. His case is handled through the Labor Department Bureau of Veterans' Reemployment Rights and his local U. S. attorney.

Last July, however, a U. S. district judge in Colorado refused to rule on a case involving a reservist who sued for reinstatement to his job following training duty as a reserve officer. The judge said the federal court's jurisdiction in a case involving brief periods of reserve training is unclear. The Labor Department will seek a clarifying amendment to the law in 1956. It's almost sure to pass.

What employers and unions can do

Management aims—The employer's legal responsibility doesn't go beyond giving time off for military service. But the government would like to see employers go further. Here's what Defense Secretary Charles E. Wilson would like to see in company policies:

. . . Leave, on top of regular leave, for annual reserve tours of duty or emergency duty, with pay; or with the difference between military pay and pay received from the employer.

. . . Personnel policies and procedures that don't discriminate against reservists, covering hiring, promotion, and transfer.

. . . Assistance to reservists in making scheduled training.

. . . A demonstrated interest in reserve activities.

. . . Organizational support to reserve activities through use of such facilities as bulletin boards, meeting rooms, training aids, transportation, company news media, exhibits, advertising in newspapers, radio, television, and other media.

Boyd Campbell, President of the U. S. Chamber of Commerce, agrees with Wilson. Here's what he told FACTORY:

"The personnel and labor relations policies and practices of virtually all business firms will be affected, directly or indirectly, by the Reserve Force Act of 1955. Although the law adds some new problems to business management, it will help clear up some old problems. For example, more and more young men will be required to attend weekly drills and two weeks of summer training. But for the first time, the essential manpower needs of defense - supporting elements of the economy get proper recognition.

"The most important initial step that management should take to insure rapid progress in strengthening our reserve forces is to make it as easy as possible for Ready Reservists in their employ to discharge their reserve training obligations. This requires granting such persons military leave, in addition to vacation time, with any deficit in military pay made up, and permitting night-shift workers to attend weekly drills without loss of pay."

Union aims—Unions are hard at

work on a two-point program to iron out contract problems arising from the reserve program. The CIO Veterans Committee, for example, is studying contracts to see how they should be changed to encompass the law's provisions. Here's what they have in mind:

. . . Liberal contract interpretation. The unions are making their big pitch to the Office of Defense Mobilization and the Defense Department. They believe they have to get support from the government in pushing management to make liberal interpretations of contract provisions. They say it would be an almost impossible job to rewrite the thousands of contracts to take the new law into account and that some sweeping interpretation — with the backing of the government—is necessary. To that end, they've asked ODM to set up a labor-management committee this fall, made up of people from the CIO and AFL; NAM and Chamber of Commerce; ODM and Defense Department. ODM indicates it favors the idea.

. . . Master agreement. The CIO Veterans Committee and CIO officers are working on one to give to all union affiliates. It would contain language to be placed in all contracts protecting the rights of employees. Here are three examples of some of the problems involved:

First, most current contracts provide that an employee away from work the day before or after a holiday loses his holiday pay. Unions don't want this to happen to a worker who might be called for training on one of these days.

Second, contracts now provide that an employee who loses, say, 30 to 35 days a year of work forfeits at least part of this vacation. A 2-week training period might conflict with this vacation right. Also, the CIO is out to protect vacation rights as such, so an employee doesn't have to train during his vacation period.

Third, workers have to be on the job for a specified period to gain company seniority, and they might lose this if called for training.

Uncle Sam sets up incentives

Meantime, the Defense Department has set up a special program to award pennants and citations to companies (not necessarily military contractors) who have exemplary reserve leave policies. These awards will be something like the "E" awards granted top-notch military producers in wartime.

The awards will be based on formal recommendations made by employee-reservists and processed through military channels. To be eligible for the award, a company's personnel policy must be pretty much in line with what Secretary Wilson has outlined (p. 143). The Defense Department plans to put a lot of hoopla into the program, hoping that more and more employers will take the hint. A Reserve Award Committee at the Pentagon headed by John Fanning, the Defense Department's industrial relations director, will have final say on award winners.

So far, no awards have been made. A company is not supposed to know that it has been recommended for a citation. The employee-reservist makes the recommendation on Defense Department Form No. 869, then submits it through the commanding officer of his reserve unit.

Protection for scarce skills—Supporters of the new Reserve Law emphasize that the military will recognize industry's need for men with skilled, scarce occupations. Two provisions are cited: the screening procedure for the Ready Reserve; and an allowance for men 18½ to 35, who have been deferred for occupational reasons, to clear up once and for all their military status by enlisting for 6 months' active service. This would be followed by time in the Standby Reserve, during which they would not have to train and from which they would be less likely to be called in case of a national emergency.

Right now, the regulations carrying out these two provisions have not been spelled out. But here's the outlook:

The military doesn't want men in the Ready Reserve who would be more valuable in industrial production under full mobilization than they would in uniform—that is, men who might get occupational deferments anyway. So as soon as possible, men with industrial skills that presumably would be scarce in an all-out war will be taken out of the Ready Reserve and made exempt from reserve training. They will then be put in the Standby Reserve. There, if war should break out, they can probably qualify for occupational deferments by local draft boards.

The following industrial occupations will probably be listed: aircraft and engine mechanic, blacksmith and hammersmith, boilermaker, chemist, die setter, airplane electrician, electronic technician, design engineer draftsman, professional engineer (all branches), laboratory-apparatus glass blower, instrument repairman, marine layout man, loftsman, jig and template maker, machinist, metal spinner, millwright, model maker, molder and coremaker, patternmaker, physicist, precision lens grinder and polisher, iron and steel roller, orthopedic appliance and limb technician, sawsmith, shipfitter, stillman, tool and die designer and maker, and apprentices and foremen.

Here's one hitch—Some of these men may be assigned to reserve units in which their occupational skills would be needed—a machinist in an Army ordnance repair compay, for instance. Or they may have some specialized military training in addition to their industrial occupation—a tool and die apprentice, for example, who has been trained in the Air Force as a jet pilot. These men will not be screened out of the Ready Reserve if the Defense Department decides they would be needed for active military service more than—or just as much as—for industrial employment in case of war.

The Defense Department will be much stricter on the other plan—the current enlistment of deferred men with scarce skills for only 6 months of active service. Only men with occupations that are *now* considered critical—not ones that would presumably be critical under full mobilization—and employed in industries classified as essential by the Commerce Department can qualify for deferment at this point.

This Machine Leads Two Lives

Not for the FBI. For K&T. Located on column line between two bays, swivel-head machine works on part in one bay while next part is set up in the other alley.

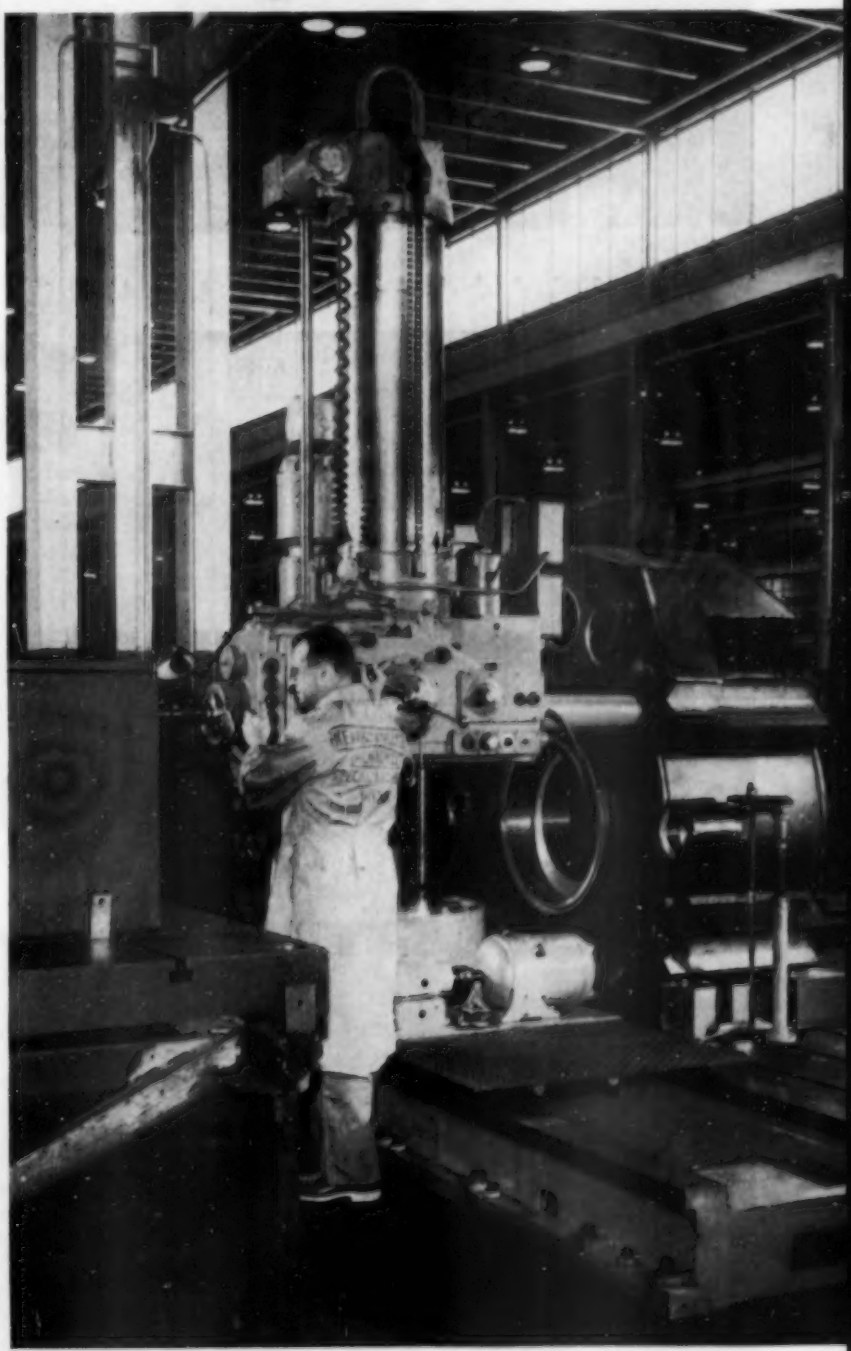
IT'S A SIMPLE IDEA. But how it's paying off for Kearney & Trecker Corporation! When K&T installed its new Kaukauna horizontal drilling machine at its Special Machinery Division (Milwaukee), it located it right on the column line between two bays. The standard machine came equipped with a 3-ft.-high, 8x10-ft. work table. It's located in one bay (at left of photograph). Then, for a boost in total cost of only 6%, company engineers installed a second worktable—12x6 feet, 6 inches off floor—in the other bay (to right of machine in photo). Machine has a swivel spindle assembly which means operator can swing it around fast to work on parts clamped to either work table.

How does it pay off? The arrangement has two major benefits:

. . . *Machine is kept busy* since it needn't be idle during set-up time. While one part is being worked on by machine, set-up man can be clamping the next job on the other platform. Then, when machine is finished with the first part, the operator can swivel the machine's spindle assembly to work on the new one. At the same time the first piece is unclamped and removed to make way for the next.

. . . *Handling is reduced.* Parts on which the machine must work are produced in both bays. So, if there were only one work platform, at least some of the parts would have to be moved into the bay with the platform by means of transfer cars. With two platforms—one in each bay—the need for any inter-bay transport is eliminated, and all handling can be performed by the 20-ton cranes in each bay. Eliminating a transfer car saved $1000.

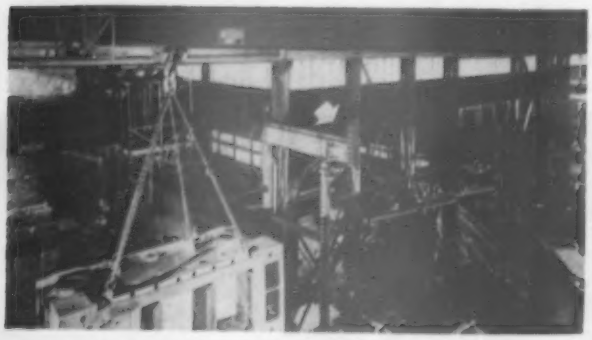
Extra dividend: Kearney & Trecker engineers used the same principle in the shipping area. Both bays use a common scale. The scale's single wooden platform is 10x35 feet. It extends into both bays—17½ feet on a side. So inter-bay transport is eliminated all along the line.



TWO WORK TABLES, one in each bay, are served by this swivel-head horizontal drilling machine. While part on table (left) is worked on, next part is set up on platform.

FACTORY | COST-CUTTERS

By WALTER F. WAGNER JR., Associate Editor, FACTORY

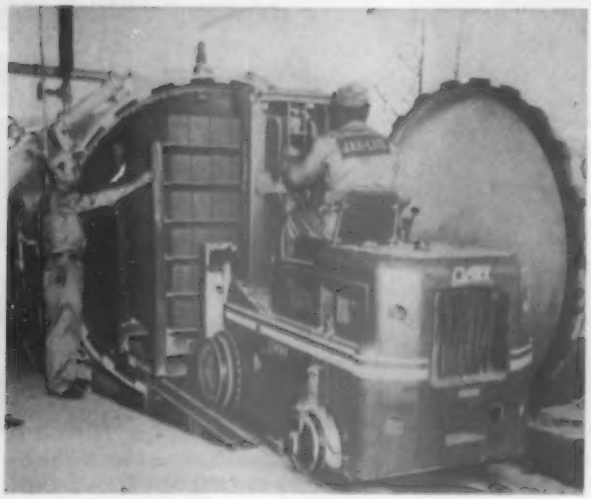


Fast Crane-to-Crane Shift

One of industry's standard toughies: How to transfer loads between cranes operating in bays at right angles to each other. Danly Machine Specialties, Inc., uses this system at its Chicago plant: One of the craneways is extended (see arrow) into the other bay. In photo, crane in foreground bay is lowering load to floor close to column line between its bay and a second bay at right angles (left background). When this crane moves away, second crane can move out on the craneway extension — into foreground bay — pick up load quickly and easily.

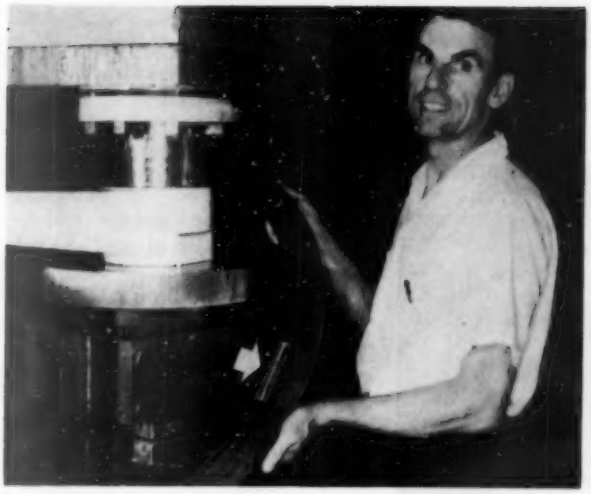
Pump Putty?

Can be done. And it's saving a lot of labor and materials at Fentron Industries, Inc. (Seattle), makers of steel and aluminum windows and store fronts. Company workers used to apply putty and caulking compounds with hand-triggered puttying guns, which had to be loaded from container with considerable loss of material and production time. Now, as in photo, materials are supplied to guns continuously by Alemite "Versatal" pumps (a product of Stewart-Warner Corporation, Chicago). The ram-type pumps, with their 6-in. air motors, are set right into the original container, are connected to gun by flexible hose. On jobs like the one shown here (sealing frames with caulking compound) one worker turns out as much production as formerly took five men, using hand-triggered guns. And time out for loading guns is eliminated.



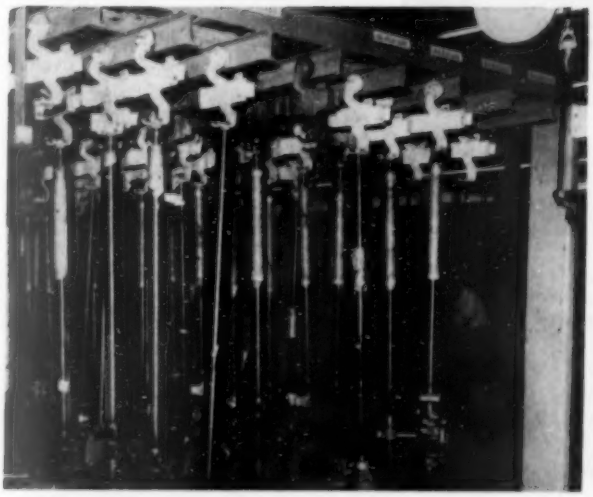
One Truck, Two Sets of Wheels

And the dual wheels give added flexibility to this fork truck at Jackson Ready-Mix Concrete, Jackson, Miss. For handling racks of concrete blocks around the plant and yard, the truck moves on its regular wheels. But the company also wanted to use truck for loading and unloading its 100-ft.-long autoclave (in which blocks are steam-cured). So two pairs of steel flanged wheels were added to the truck, enabling it to operate on rails set in the floor of the autoclave. The front flanged wheels are bolted to the regular front drive wheels. The rear flanged wheels are supported in a U-block that's bolted to the fork truck frame in direct alignment with the regular wheels. When truck is operating on its regular wheels, the flanged wheels clear floor by several inches. Cost of this quick-to-pay-off modification: Only $250.



Let Aluminum Take the Beating

Until two months ago, North American Aviation faced a tough problem. About 40% of all stainless and titanium parts that were processed on stretching or shrinking machines were damaged by the jaws of the machines, had to be reworked by buffing or other means. Cloth wraps kept the jaws from chewing up some of the smaller parts, but didn't protect larger parts at all. Then an employee at the company's Los Angeles plant came up with this idea: Let aluminum be the whipping boy. Acting on the employee's tip, North American wraps protective aluminum strips around the part, clamps the jaws on the aluminum instead of the part itself. Does it work? Company officials say damage is now "almost nonexistent," have made idea standard operating procedure in all plants. (Re operator's grin: You'd grin too, if you'd won a $925 suggestion award.)

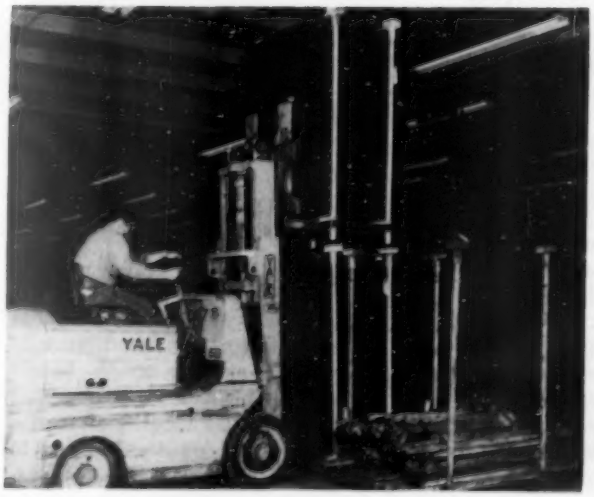


Hang 'em to Handle

Getting awkward steering assemblies from the final adjustments bench to the final assembly line used to be a big headache at Autocar Division, The White Motor Company (Exton, Pa.) But this overhead bank of monorail conveyor track and trolley carriers solved the problem.

As the workers who adjust the steering assemblies complete a unit, they hang it vertically on one of the trolley carriers. (The conveyor bank is only a step away from their bench.)

From this "in" end of the bank, units travel along track to the final assembly line. The entire bank holds 120 assemblies. That means there's plenty of room for out-of-the-way surge storage of steering assemblies not needed immediately on the assembly line. Vertical storage, of course, minimizes space requirements.



Racks Save Space Two Ways

You can stack 'em when they're loaded, as operator is doing here. When empty, you can collapse them, move them out of the way. Cleveland Steel Products Corporation saved enough space with these racks to discontinue outside storage of forgings, move them in out of the weather. Which means no more cleaning, no more pitting, much less handling time.

Simple is the word for the racks, built by Republic Steel Corporation (Cleveland). They consist of eight fabricated crosspieces slipped over four tubular uprights. No fasteners—a rack is held together by weight of its load. Racks—which come in different sizes—have flanges at top of uprights to make stacking easy. Collapsed, 100 racks can be piled on one assembled rack. That means they can be handled easily, take up a minimum of space when not in use. Knock-down takes less than a minute.

FACTORY | NEWS

By W. A. STANBURY JR., Associate Editor, FACTORY

HUGE DOME covers two acres of unobstructed floor space.

World's Biggest Dome

It's good to look at from any angle—practical, too. And a new way to get elbow room for your new plant.

If unobstructed floor space for your new plant is what you're looking for, the Charlotte, N. C., coliseum has something that rates attention—the biggest dome anywhere. With aluminum roofing, supporting pillars are necessary only around the circumference of the two-acre area.

The dome surface consists of 3665 pieces of aluminum stretching upward in a convex latticework and supported by a steel-ribbed web frame. Tension ring that absorbs the thrust of the arched roof ribs is 2 inches thick, 32 inches wide, 1000 feet in circumference. Central compression ring has a diameter of 46 feet. Both are made of welded steel sections. Prefab, ground-welded ribs were put up in sections of three, with one section emplaced in each quadrant at a time to insure a balanced load. Dome sections are 176 feet long, weigh 14 tons. The one-piece cap has a radius of about 60 feet.

Charlotte's dome, engineered to take 125-mph. winds, is watertight and allows for expansion and contraction. Sheet for the roofing is supplied by Aluminum Company of America's Alcoa, Tenn., works.

Rubber Unlimited

A single molded rubber part to girdle the earth? United States Rubber Company could make one—if somebody wanted it. With close dimensional tolerances, too. Matter of fact, reel size is the only limit on length of parts. USR does it by continuous molding. Says the process is cheap, fast, and accurate. Manufacturing advantages: exactness, and use of softer rubber stocks to give springiness or compression. From the users' standpoint, main advantage is elimination of scrap. Lengths can be cut as needed because rubber reels off in miles instead of feet.

USR has a long list of tested and suggested uses.

Let SARA Do It

Want a high-speed monitor and recorder wrapped up in one? SARA may be your answer. At Tennessee Valley Administration's Shawnee Plant she's acting as combination telephone operator, complaint clerk, and secretary for the central control system. SARA's a Sequential Annunciator System—biggest ever built. Product of Taller & Cooper, Inc., Brooklyn, she's one of six sold—three to TVA, the rest to the Atomic Energy Commission.

SARA monitors up to 700 trouble spots at once. If something goes wrong, she sounds and blinks a warning, reports it all on a running record. She'll handle 70,000 events per second, as close as 15 microseconds apart. With a data reduction system, the big machine also can log process variables—temperature, pressure, flow, etc.—in actual value on demand or at periodic intervals, thus helps in quality control.

But trouble is SARA's main dish. Busy clerks don't have a chance to enter all the facts when things go wrong. SARA does the job for them. Later, engineers have a complete record to study, can prevent recurrence of trouble.

TINY WALKIE-TALKIE is a transistorized FM set—low in weight and bulk.

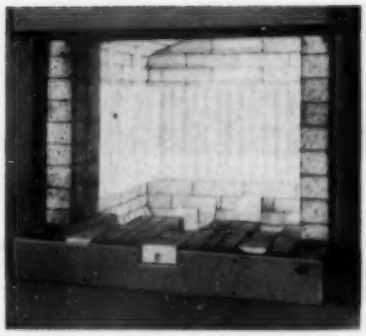
Tin-Hat Talker

The soldier you see in the photo above is using his head to talk. What he's wearing on his helmet is a super-small walkie-talkie. He's testing it for the Signal Corps. But don't worry—you don't have to wear a tin hat in order to broadcast

or receive around the plant. Just tuck this tiny FM set—it's the smallest of its kind—in your shirt pocket and get handy, roving communications wherever you are. And Radio Corporation of America, the outfit that makes it, says it has a ¼-mi. range.

The transitorized set comes as one- or two-way. It's self-contained and self-powered. Antenna is collapsible. So far it's only experimental, but it shows possibilities for broad application in the industrial communications field.

Easy operation. The set has only two controls for two-way use—a push-to-talk button and a combination on-off and volume control switch. It gives up to 10 hours of service with one tiny battery. Receiver-transmitter, microphone-earphone, antenna and battery are all housed in that tobacco-tin size assembly on the helmet. It all adds up to 15 ounces of dependability and ruggedness.



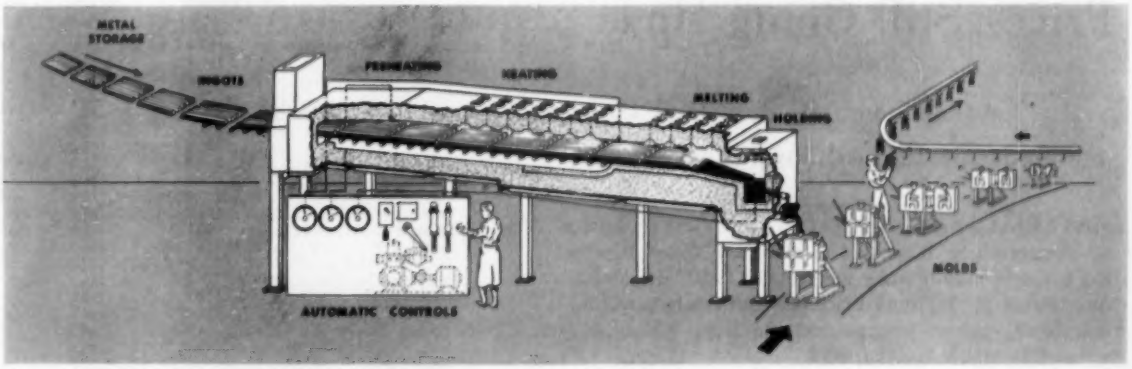
NEW-TYPE HEATING ELEMENT answers problems in heat treating furnaces.

Clean Up Heat Problems

May as well throw out those insulation pipes. Muffles and retorts, too. Why? Because there's a new electric heating element for atmosphere-controlled heat treating furnaces—Corrtherm. No more soot problems. Corrtherm elements are those sheets of corrugated nickel chromium that practically cover the walls of the furnace in the picture (left). They're hung from alloy hooks extending through the roof. Results: easy installation and replacement, no support or hangers built into the walls.

With Corrtherm, carbon-caused short circuits just don't happen. Voltage is so low leakage is impossible. And that means operators needn't worry any more about touching elements. They can't even feel this low voltage. And by making the transformer an integral part of the furnace, Lindberg Engineering Company, the manufacturer, has managed to keep it down to a reasonable size.

As an added touch for plants using forced convection furnaces (where high temperature fans force hot gases through the charge being heated) Corrtherm elements act as a direction baffle—no more gas short circuits. Heat the gas, too.



TUNNEL FURNACE takes aluminum non-stop from ingot to ladle.

Non-Stop Aluminum Casting

You don't have to fool around with big batch melting to get the aluminum you need for casting.

Not any more. Today you can have molten alloys as needed with continuous in-line melting, as in the drawing above. First, the steel industry broke out the process. Now, with a new type radiant tunnel furnace, aluminum is profiting too. Here's what it means:

. . . *Uniform efficiency and cost savings* from furnaces producing from 300 to 3000 pounds of molten metal per hour.

. . . *Time saving*—the start-up charge is ready for pouring in less than three hours.

. . . *Low fuel costs.*

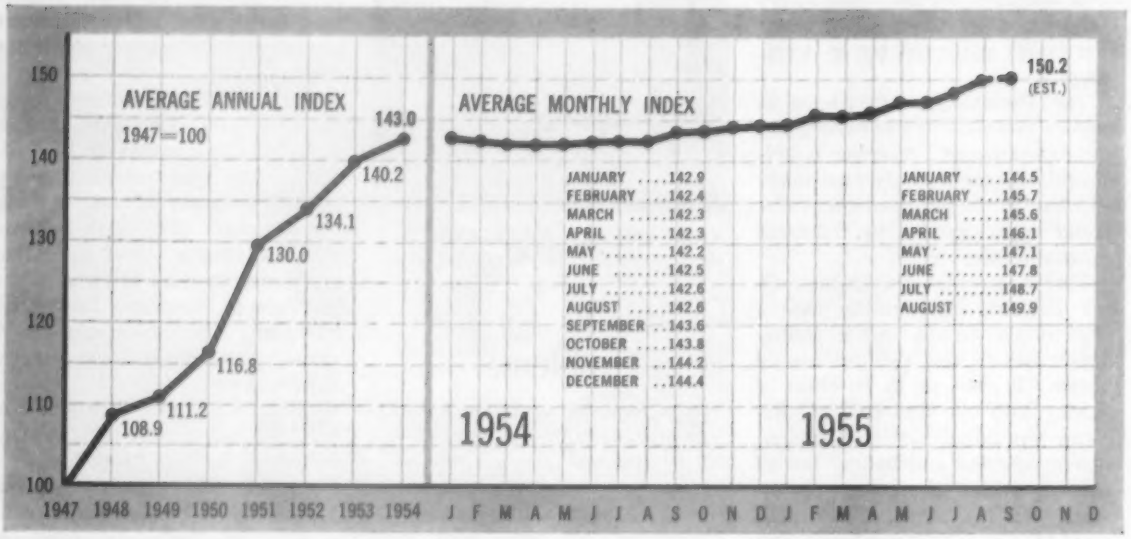
. . . *Better production scheduling*—Heat layoffs are eliminated.

. . . *Less labor turnover* from cooked employees.

. . . *Insured quality controls*—Castings show the same analysis as the ingots they're poured from and are uniform from casting to casting.

At Monarch Aluminum Manufacturing Company, Cleveland, the lead-off plant, ingots are loaded at the upper end of a small tunnel furnace sloping down to the output end. Monarch's furnace was engineered by Selas Corporation of America. Speed and fuel control melting rate and pouring temperatures. A radiant roof of 60 burners covers the final third of the ingots' path. Preheat for the rest is provided by combustion products. Within 24 to 30 minutes molten metal is flowing into a pouring ladle.

FACTORY | COST INDEX



Prices Still Going Up

And a boom in industrial building and modernization will keep them up.

MATERIALS PRICES in FACTORY's Cost Index moved up precipitously in August to chart the sharpest increase for a single month since December, 1950. Industrial requirements for building materials and equipment this fall will likely permit prices—and the Cost Index—to rise somewhat higher by year-end.

The upswing in prices reflects two events that have dominated the economy this year:

. . . *Wage rates have moved up considerably,* and have added to cost of production. These costs are now working themselves out in higher prices.

. . . *Industry is building new plants and modernizing old ones* at a much faster rate than anticipated earlier. This activity will assure a market for industrial materials even though prices are rising.

* * *

FACTORY's "Cost Index of Plant Maintenance" keeps you informed of monthly changes in cost of 1) upkeep, repair, and replacement of plant buildings and facilities; 2) upkeep and repair of operating equipment. Source of all figures: *U. S. Bureau of Labor Statistics.*

For complete information—including cost indexes for the 6-year period 1948-1953, and "10 Ways to Use the Cost Index"—send for a 16-page reprint of "FACTORY's Cost Index" (originally published in January 1954). Price 50¢. Address Editor, FACTORY, 330 W. 42nd St., New York 36.

	AVERAGE 1954	PREVIOUS MONTH (Revised)	LATEST MONTH (Aug.)
Building and Facilities Index	**139.6**	**143.9**	**145.0**
Materials	125.7	131.1	133.2
Brick	132.6	136.9	138.5
Elec. fixtures	115.1	120.5	120.5
Elec. switches, boards, fuses	141.9	142.3	146.5
Elec. wire, copper	130.3	152.4	152.4
Glass	137.3	145.2	145.2
Gutters, spouts, ducts	144.5	158.1	158.1
Gypsum products	129.2	129.2	129.2
Heating equipment	120.0	119.2	121.2
Lumber	124.2	132.4	133.8
Millwork	149.6	147.0	147.0
Paint	114.4	116.4	116.4
Pipe, cast iron	140.9	147.9	147.9
Pipe, steel	148.0	163.3	163.3
Pipe & tubing, copper	142.7	156.0	163.1
Roofing	110.5	117.7	121.7
Sanitary fixtures	144.3	144.3	151.5
Sash, metal frame trim	134.1	149.4	151.7
Solder	115.8	120.9	121.9
Steel, structural	170.3	186.5	186.5
Tanks, steel	121.0	127.9	130.8
Valves & fittings	130.6	135.7	137.7
Wire mesh	155.7	155.2	167.5
Labor	148.8	152.4	152.9
Carpenters	143.4	144.5	145.0
Electricians	152.1	154.5	155.0
Painters	151.8	158.2	158.8
Equipment Index	**144.5**	**150.8**	**150.8**
Materials	136.7	143.1	146.0
Abrasives	129.7	130.0	130.0
Alloys, non-ferrous	117.6	137.4	144.0
Bars & plate, steel	177.8	185.3	189.8
Bearings	140.7	145.5	145.5
Belting	135.1	141.6	141.6
Bolts, nuts & screws	174.9	176.5	187.1
Chain	137.6	149.9	153.8
Controls (electrical)	141.9	142.3	146.5
Gear-reduction units	143.8	150.1	151.9
Hand tools, mechanics	157.8	164.0	164.6
Lubricants	63.9	64.5	65.4
Motors	124.7	122.9	122.9
Non-ferrous metals	121.3	136.0	138.0
Precision tools	126.9	137.6	137.9
Pumps	143.2	146.5	147.0
Tools, cutting	129.0	149.9	149.9
Valves & fittings	130.6	135.7	135.7
Labor	145.9	155.9	155.9
All mfg. labor	146.0	152.8	152.8
Machine tool labor	153.2	159.0	159.0
FACTORY's COST INDEX	**143.0**	**148.7**	**149.9**

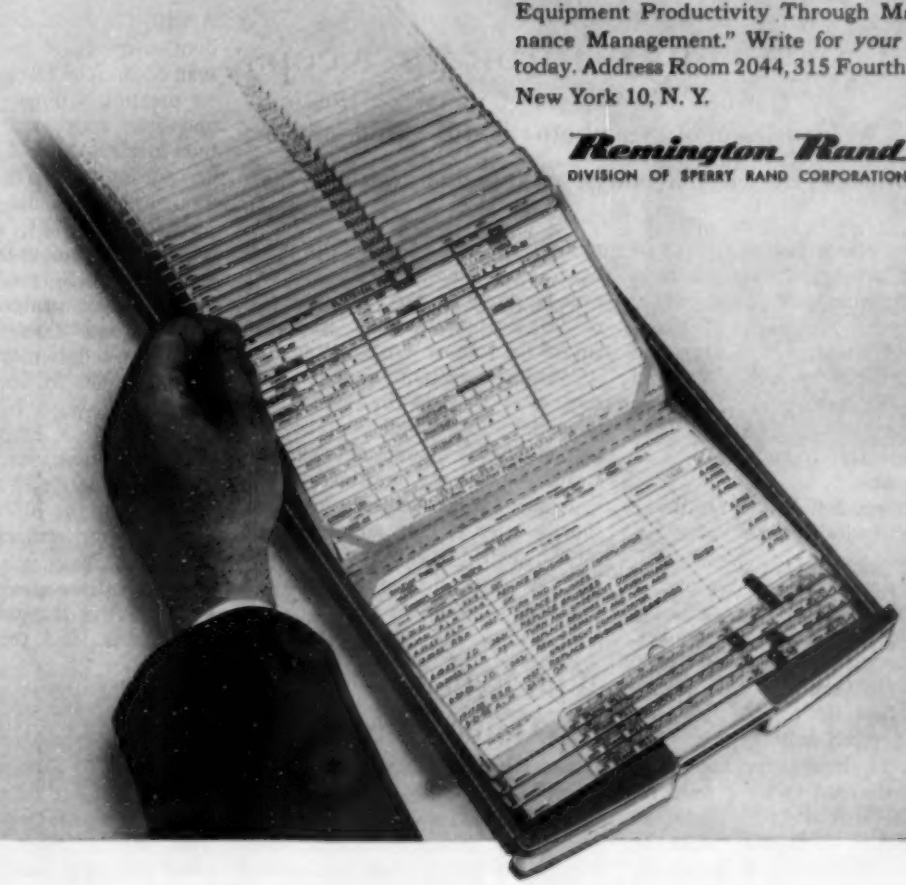
Let's Talk About Productive Maintenance

The ideal basis for any productive maintenance program is Remington Rand Kardex. Remington Rand Kardex combines in a single, accessible record complete information about each machine – characteristics, frequency of repairs, maintenance service and costs. Colored Kardlok signals let you review your entire program in a matter of moments, providing quick, effective, "locked-in" control.

In addition, Kardex is the ideal record for spare parts inventory control. An effective stores control system is indispensable to preventive maintenance. Without proper inventory control of replacement parts, valuable production will be lost and machine down time greatly increased.

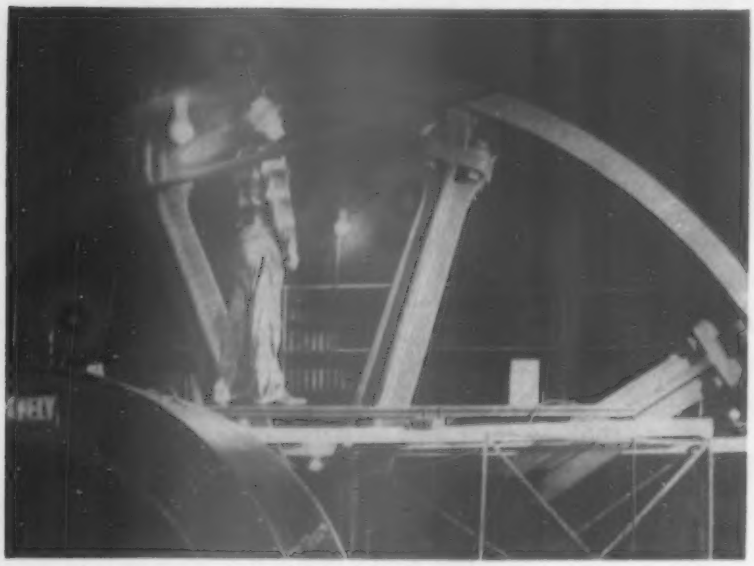
Both these applications of Kardex are discussed in FREE booklet X1383, "Assured Equipment Productivity Through Maintenance Management." Write for *your* copy today. Address Room 2044, 315 Fourth Ave., New York 10, N. Y.

Remington Rand
DIVISION OF SPERRY RAND CORPORATION



FACTORY | MAINTENANCE TRENDS

By CARL G. WYDER, Maintenance Editor, FACTORY



WEEKLY INSPECTION of a welded flywheel shows no flaws, proves . . .

You Can Weld Cast Iron for Keeps

Welded segment (see photo) is still sound — after 16 months' service. Replacement gathers dust on shelf.

Not many plants can still boast of a 1902 Corliss steam engine with a 22-ft. flywheel as a power source. But the way the Wickwire Company of Cortland, N.Y., repaired a serious break in such a flywheel shows how modern electric welding can rebuild bad breaks in a heavy cast-iron frame, make it as good as new.

A year ago last May a fire broke out in Wickwire's engine room, enveloped the flywheel in flames. Water from the fire hoses hit one of the peripheral segments, cracked it in two places near adjoining spokes. Downtime meant a loss of $1000 per day. Delivery of a new casting took at best 30 to 60 days. Insurance covered only a fraction.

So H. D. Baker, machine shop foreman, decided to try a weld repair with Ni-Rod "55" electrodes (55% nickel, 45% iron, made by International Nickel Company). He had to be sure of a high-strength weld, for if the 2800-lb. segment ever let go at the top running speed of 90 feet per second, it would rip off the roof or wreck the engine.

Welding began at noon on one day, was finished by early next morning. Gas-torch preheating helped relieve any uneven expansion strains. Total job cost was $350.

A new $1650 segment purchased shortly after is still gathering dust on the shelf. Weekly tests (including dye checks) show the repaired segment as sound as ever.

Who Killed the Game Fish?

Guess who got blamed for a fish kill along a 70-mile stretch of the upper Ohio River late in May?

Industry, of course. Local opinion had it that a plant had spilled acid into the river. In one area, hundreds of dead fish, including muskies and trout, filled the banks.

Fortunately sanitary engineers of several states went on the prowl — and after several days of sleuthing found the real reason:

Civil defense authorities of one river town had de-watered a mine. They had pumped millions of gallons of highly acid water into the river.

This alarming tendency for the public to blame industry is just another good argument for industrial-waste control. If you've got it, you're in the clear. If you haven't, you're suspect no matter what. And there may be no sanitary engineers around to clear you.

What's Best Level In Water Tanks?

Actually the best water level is seldom over 40% and usually less than 35%. The exact point depends on pressure settings. But much air and little water are always better than much water and little air.

Surprise you? There are operators, says Automatic Control Company (St. Paul 4), who still insist on filling the tank to the 50%, 60%, and even 70% mark. Then they push in some compressed air, and expect good results. What they really get is lots more pump wear; the pump has to work overtime to keep the air-water balance.

Let's prove it. Start with a 1000-gal. empty tank, set to work "on" at 70 pounds, "off" at 80 pounds. Add water to the 10% volume mark, then air (the remaining 90%) at 80 pounds. Now you can drain out all the water—nearly 100 gallons —before the air pressure falls to 70 pounds, and the pump starts to refill.

But if you begin with 90% water instead of 10%, and 10% air at 80 pounds, you can't remove more than 10 gallons of water before the pressure falls to 70 pounds. And the pump will start to refill. This means more pump cycles, lower efficiency, more wear and tear.

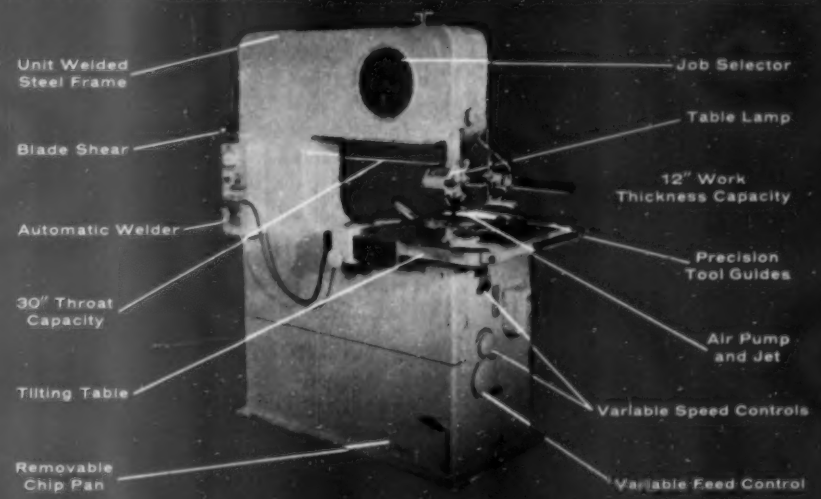
Here's a One Man Machine Shop To Fit Any Budget

Saw . . . Slice . . . Grind . . . File . . . Polish

with this economy priced

30" DoALL Contour Machine

Check these features usually found only in higher priced band machines:



Job-proven attachments like this disc cutting setup combine accuracy with ease of operation.

Mitering attachment for precision cut-off at any angle.

Large capacity for contour cutting a wide variety of materials.

Never before could you buy so versatile a 30" band machine for so moderate a price. This new DoALL "one-man workshop" will handle thousands of contour sawing jobs—will file, grind and polish as well.

Guaranteed DoALL quality through and through—designed for light to medium cutting of metals and non-metallics of all kinds. It is ideal for sheetmetal and pattern work, many foundry applications, tool and die making, maintenance and experimental work and hundreds of production line jobs.

Look at the available attachments above—look at the jobs at the right—then ask for literature telling of the many features and possibilities for profit with this new 30" DoALL. Call your local DoALL Service Store, or write to The DoALL Company, Des Plaines, Ill.

4 Models to choose from . . .

SFP—(shown above) for contour sawing, filing, polishing, friction cutting, carbide tool finishing. Wide speed range 50 to 5200 fpm.

LSV—Variable low-speed machine for metal sawing and band filing. Speed range from 50 to 300 blade feet per minute.

HSV—Variable high-speed machine for sawing, friction cutting, polishing or carbide tool finishing. Speed range variable from 850 to 5200 fpm.

HS—An efficient high-speed band sawing machine. Speed 4000 fpm. Also available with step pulley to give 2000, 3000, 4000 or 5000 fpm.

"World headquarters for band machines and tools"

THE DoALL COMPANY

Des Plaines, Illinois

FRIENDLY DoALL STORES . . . (in 37 cities)

Personalized Service . . . Complete Stocks . . . Local Delivery

Band Machines . . . Surface Grinders . . . Measuring Instruments

Saw Bands . . . Surface Plates . . . Cutting Tools In Stock

. . . for FREE DEMONSTRATION

FACTORY | ELECTRICAL TRENDS

By F. W. MICHAL, Electrical Editor, FACTORY

TWIN RADIOACTIVE DEVICES keep tabs on thickness of rubber coating and signal automatic controllers as tire fabric speeds through this 4-roll calender.

New Work for Isotopes

Better keep abreast of new plant uses for nuclear energy. Here's one that measures coatings automatically.

Need uniform accuracy in coatings? Then give "AccuRay" a try. It's an atomic device used by Mansfield Tire & Rubber Company, Mansfield, Ohio. It controls — automatically — a 4-roll, inverted-L calender that lays a top and bottom rubber coating on tire fabric.

Secret of "AccuRay" is a pair of measuring units that use invisible rays from radioisotopes to give weight readings on each inch of fabric produced. If the coating varies from specification, the measuring units signal the automatic controllers to adjust the coating rolls. Each nuclear unit — one on each side of the sheet of fabric, as shown in the photo — has its own controller. And each nuclear unit records exact weight of the fabric on a continuous strip chart. The installation has boosted uniformity, saved material and labor. "AccuRay" is made by Industrial Nucleonics Corporation, Columbus.

Checking Static Around V-Belts

Here's a good practical tip on checking for potentially dangerous static electricity around V-belts. Idea comes from researchers of Dayton Rubber Company. Just hold a 1/25-watt neon glow bulb near the belt. Any static electricity will light the bulb. But watch out—especially on dry days. There may be enough static to knock the bulb right out of your hand. If static gets too bad and equipment is in an area where there's danger of fire or explosion, you might want to change over —right away—to specially designed, static-free V-belts.

Ready to Paint Your Transformers?

Don't turn your painters loose until you've got a copy of "Repainting Transformers in the Field" from General Electric Company, Schenectady 5. Ask for Bulletin GET-677F. It's an 8-page job. Covers paint preparation, number of coats, ways to get longer paint life.

Next–Smaller Motors With 1267

What's this 1267? It's today's new magic number — at Westinghouse. You'll be hearing a lot about it soon. Stands for a new insulating enamel for copper wire — a modified polyester-type resin that contains 20% silicone.

How good is 1267? Well, laboratory tests on electric motors with the enamel show that motors can operate continuously for 10 years at a temperature of 325 F. Also, motor sizes can be whittled down by using the new enamel to replace glass insulation normally required for high temperature. For example, tomorrow's 7½-hp. motor would be no larger than today's 5-hp. motor.

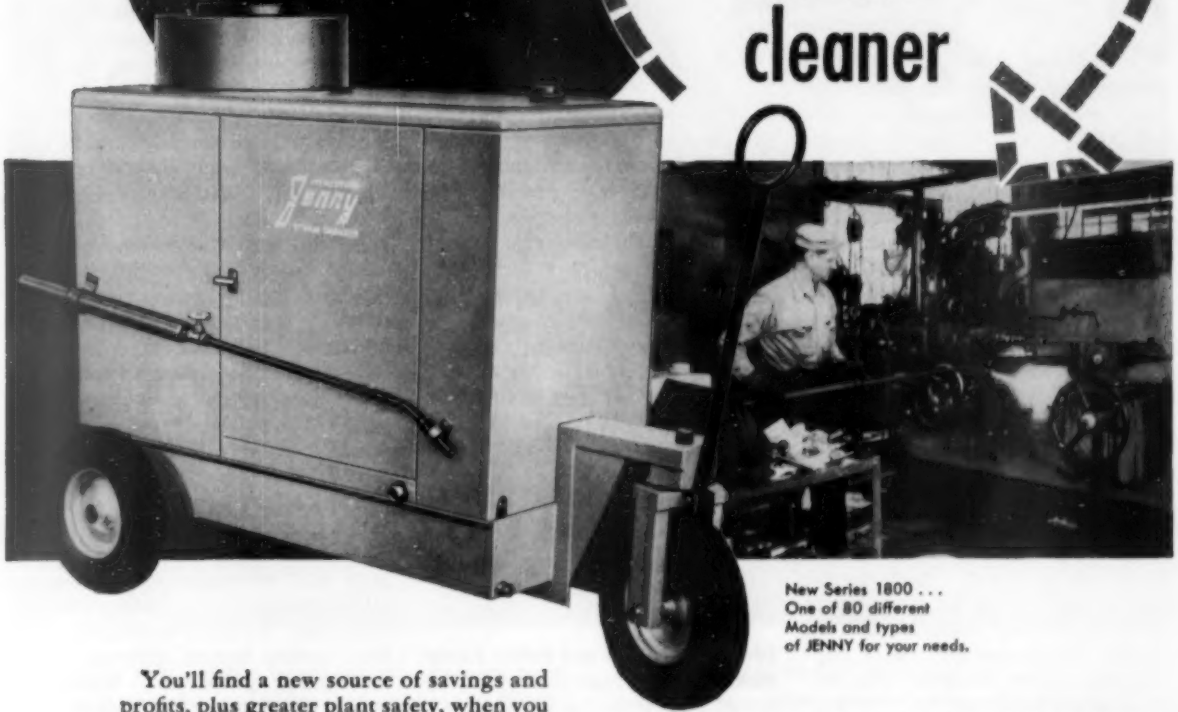
Electrical Fires Get Top Listing

That's what Associated Factory Mutual Fire Insurance Companies report for 1954. Out of 3179 industrial fires, 745 (23.4%) were classified electrical. They occurred because electrical equipment was improperly installed, poorly maintained, or just worn out. Also because electrical devices and fittings were types unsafe for areas with flammable vapors and dusts. In addition, 59 fires (1.9% of total) were caused by sparks from static electricity (due to the absence of adequate grounding, static eliminators, humidification), which ignited the dusts and vapors.

FRIENDLY DoALL STORES . . . (in 37 cities)
Personalized Service . . . Complete Stocks . . . Local Delivery
Saw Bands . . . Surface Plates . . . Cutting Tools In Stock

tool up FOR YOUR cleaning jobs... ...prevent fires

with HYPRESSURE Jenny steam cleaner



New Series 1800 . . .
One of 80 different
Models and types
of JENNY for your needs.

You'll find a new source of savings and profits, plus greater plant safety, when you "tool up" for cleaning jobs with Hypressure Jenny Steam Cleaner. Jenny removes grease, cutting oils, and protective coatings from machinery, equipment, sub-assemblies, and castings, before repair, repainting or machining—and does it ten times faster than by ordinary methods! It promotes safety by eliminating the fire hazard of greasy conveyor chains and floors, and the use of inflammable cleaning solvents. It cleans ribbed glass windows for better illumination; keeps floors and runways free of dirt and grease for safer, faster plant traffic. Jenny steam cleaning often reveals damaged or worn parts for repair before costly production delays or breakdowns occur. In fact, Jenny does most any cleaning job for one-tenth the cost of cleaning by hand. So find out how easy it is to bring these savings and safety to your plant.

Mail the coupon today for full facts. No obligation.

HYPRESSURE JENNY DIVISION

HOMESTEAD
VALVE MANUFACTURING COMPANY
"Serving Since 1892"
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FACTORY | CATALOG NEWS

To get these catalogs, circle item numbers on the Reader Service Card next to back cover.

PRODUCTION METHODS

1—Chromium Plating. Bulletin CFC-1 shows cross-section and surface views of crack-free Unichrome process. Outlines advantages, emphasizing corrosion resistance and buffability. Gives data on make-up and maintenance of plating solution. *Metal & Thermit Corp.*

2—Machining Aluminum. 52-page pocket-sizer contains technical data and tooling information on producing parts with automatic screw machines. Covers types of machines, machining speeds, feeds, cutting fluids, and tool angles. *Kaiser Aluminum & Chemical Sales, Inc.*

3—Vacuum Forming. Simply written text of 40 pages lists advantages. Describes process equipment, mold design, mold preparation, production techniques, methods of decorating and post-forming thermoplastic sheets. Over 50 illustrations. *Monsanto Chemical Co.*

4—Printed Circuitry. Producing methods are discussed in this 12-page bulletin—most important ones in detail. Cites economies compared with handwiring. Specifications on grades and properties; use of copper-clad plastic insulator. *National Vulcanized Fibre Co.*

5—Adhesive Bonding. 8-page manual illustrates applications in aircraft aluminum honeycomb construction, fin tubing heat exchanger assemblies, printed circuitry. Discusses selection of correct formulation and process for requirements. *Rubber & Asbestos Corp.*

6—Cutting and Grinding. Brochure is a 56-page pocket size reference on procedures. Covers the best methods for 13 materials in 15 operations. Describes the proper use of coolants to obtain longest life and best working conditions. *Master Chemical Corp.*

7—Infra-Red Heating. "Applications Unlimited" answers questions on uses, advantages, cost. Explains and illustrates infra-red process. Case histories cite savings in baking, drying, preheating, degreasing. Shows various ovens. 20 pages. *Fostoria Pressed Steel Corp.*

8—Precision Manufacturing. Catalog 55-1 offers service for production of close tolerance parts, from single piece to mass production of large quantities. Illustrates various types of machines used. List of some manufacturers served. *Lake Shore Industries, Inc.*

9—Automatic Weldment Cleaning. Production Economiser No. 6 covers abrasive blast cleaning of rust, flux, spatter. Case history cites 75% saving in grinding time, better quality weldment, better surface for coating. *American Wheelabrator & Equipment Corp.*

MAINTENANCE

10—Maintenance and Safety Equipment. This 64-page Catalog 30 discusses equipment for a wide range of maintenance jobs—commutator, motor, electrical, mechanical. Covers safety and production equipment. Includes detailed descriptions and photographs of equipment. *Martindale Electric Co.*

11—Moving and Special Maintenance. Slim-Jim booklet of 16 pages gives information on plant relocation; rigging and hoisting; machine erection, moving, leveling and alignment, processing for storage. Offers to help do any of them. *Roger Sherman Transfer Co.*

12—Concrete Floors. Cleaning, finishing, and daily maintenance tips are contained in this 12-page booklet. Illustrates common faults due to improper construction or maintenance, and tells how to overcome these problems. *National Sanitary Supply Assn.*

13—Maintenance Supplies. 168-page Catalog No. 19 describes and illustrates parts, supplies, equipment, tools, accessories, etc., for heating, air conditioning, electrical services, motorized equipment, power plants, and many other types of equipment. *A. R. Webber Co.*

14—Electrical Maintenance. Bulletin 555 covers important angles. Describes testing equipment for assuring proper performance of current-actuated protective devices. Recommends procedure for test record system of preventive maintenance. *Multi-Amp Corp.*

MATERIALS

15—Stainless Steel. Catalog 55 contains data on pressure-temperature ratings, converison factors, fluid resistance. Hardness conversion tables, casting factors, physical and mechanical properties. Selection charts cover over 300 corrosives. *Cooper Alloy Corp.*

16—Super Dylan Polyethylene. This bulletin shows in detail the heat resistance, rigidity, chemical resistance, low temperature toughness, tensile strength, easy processing, and good appearance of this new thermoplastic. Applications. 16 pages. *Koppers Co.*

17—Specialty Steels. 32-page illustrated guide helps match proper steel to job. Covers tool and die steels, stainless steels, silicon and

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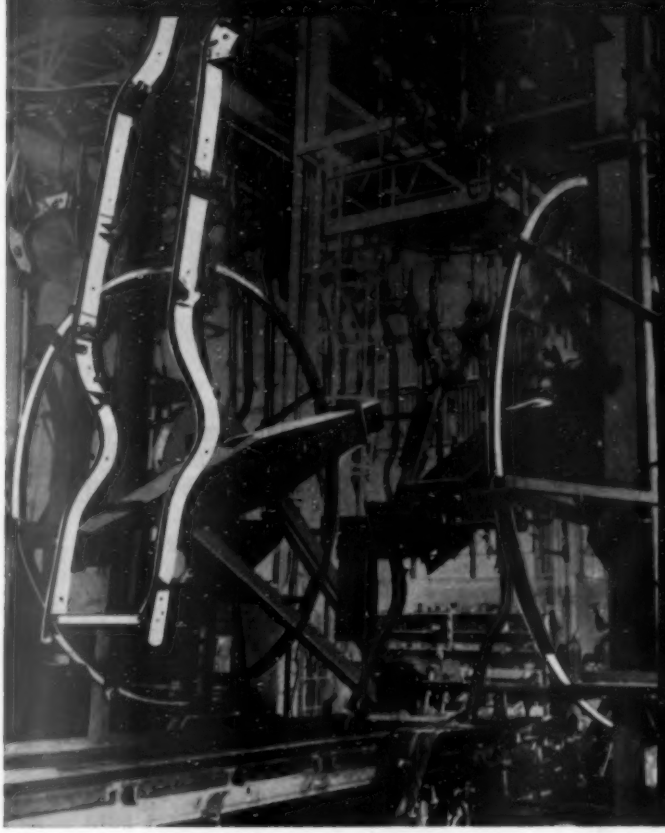
JERVIS B. WEBB

CONVEYOR ENGINEERING, MANUFACTURE, INSTALLATION and AUTOMATION

FROM SLAT TO TROLLEY CONVEYOR *Automatically*



Ferris wheel developed by Webb automatically lifts frames from assembly line and hooks them on overhead trolley conveyor.

. . . Another Example of

WEBB

Automation

Located in Philadelphia is one of the country's most modern plants for producing passenger car chassis frames. It is equipped with conveyor systems that automatically carry 3,000 of the large frames a day through various assembly operations, painting and shipping.

Slat conveyors are used in assembly and shipping departments while overhead trolley conveyors carry assembled frames through washing, painting and drying.

At the end of the final assembly line, frames are automatically picked off the slat conveyor by a unique two-arm Ferris wheel device (designed by Webb) and hooked on the overhead conveyor for washing and painting. Another automatic device, built by Webb, has three trunnion-mounted arms which pick frames off the overhead conveyor after painting and deposit them on the slat conveyor in shipping room.

For automatic handling of any size or type of material, Webb engineering experience and reputation is your best assurance of receiving the finest in conveyor automation.

Write to us on your company letterhead and we will be happy to place your name on the Webb mailing list to receive factual technical information on conveyor installations, case history reports, and new product literature.

JERVIS B. WEBB CO.

Specialists in Custom Conveyor Systems

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Offices and Representatives Throughout The World • FACTORIES: *Detroit* • *Los Angeles* • *Hamilton, Ontario*

For more about these products, circle item numbers on Reader Service Card next to back cover.

MEASURED FLOW into tote boxes, handling baskets, corrugated bins, is controlled with handy lever. Parts are ready for use or storage.

FULL BOX or keg is slid into loader. Lid of box has been removed.

UNIT ROTATES easily. Parts flow into pouring spout with retaining gate.

Tip and Pour Small Parts

Simple way to get cumbersome receiving boxes out of the way, put contents in convenient handlers.

TRANSFER of small parts from shipping boxes and kegs to in-plant containers is a cinch with the Nes-Tier Rollover Loader. Receiving containers can then be put where they should be—in your stores area. And here are some bonus benefits you'll get: No more costly manual operations, damage and loss to parts, complicated inventories, cluttered plant. Controlled flow feature allows accurate measurement of parts into your convenient in-plant containers. Just place containers on scales and meter in the parts. A natural for inventory control.

Short length of roller conveyor is available as accessory for holding and feeding containers ready for discharge. Loaders are made for all sizes of shipping containers. They're balanced for minimum effort in rotating safely, easily—can be handled by female workers.

Charles Wm. Doepke Mfg. Co. (Circle No. 1, Reader Service Card.)

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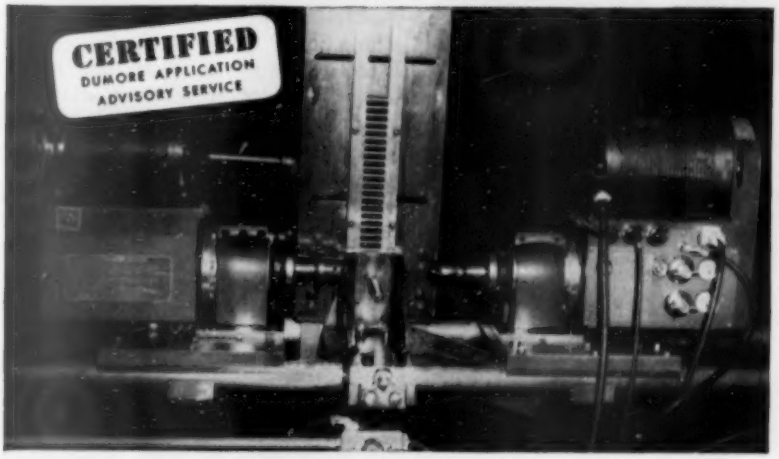
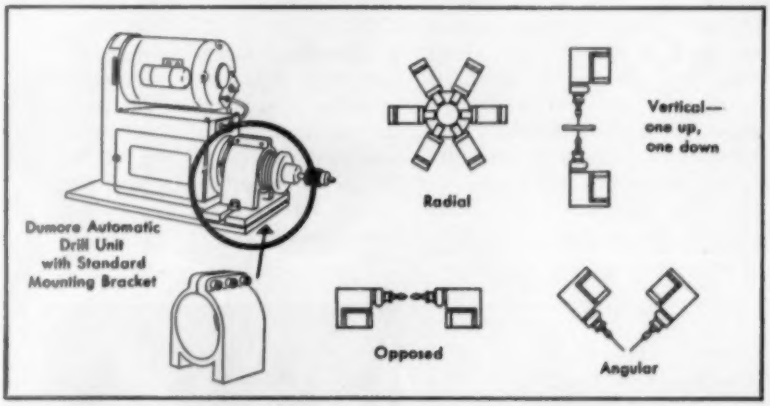
Facing-Deburring Job Speeded Up 300% with Versatile DUMORE Automatic Drill Units



This "Special" Machine, constructed from standard parts, faces and deburrs four times as many steel pipe sections as the previous method. As each part falls from the hopper to the fixture, an automatic switch actuates a clamping device to hold the part. The two Dumore Automatic Drill Units, also actuated, advance, face and deburr the ends simultaneously, and retract to starting position—all automatically.



Key to Simplicity of the Dumore Automatic Drill Unit is the standard mounting bracket which permits quick removal and transfer of Dumore Units to other shop operations. These low cost brackets quickly adapt Dumore units...at any angle...to existing shop equipment. Dumores are delivered complete and ready to be used. All controls, electrical and pneumatic are built in.

Star Tubular Products Co. of Chicago wanted to step-up production of their welded steel pipe sections. A major stumbling block was the slow job of facing and deburring both ends of each section. The process required handling each part three times: facing and deburring one end, removing and reversing the part, facing and deburring the other end. Output was 135 pipe nipples per hour. Dumore was asked to find a better, faster method.

Technical Application Aid

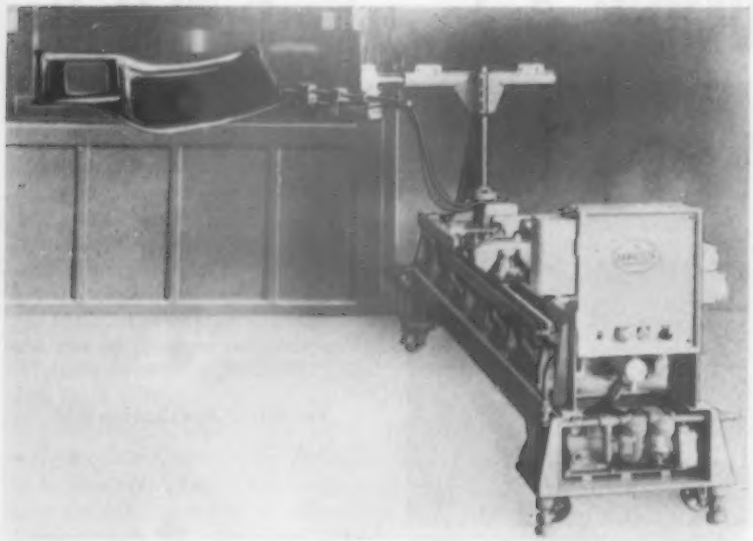
Dumore's Application Advisory Service recommended a set-up that resulted in the machine pictured at the left: two Automatic Drill Units opposing each other with a hopper feed for the pipe sections in the center. As each pipe section falls into the fixture, it actuates the Automatic Drill Units which move in and face and deburr each end simultaneously, retract to starting position, actuate work feed and advance again—all automatically.

Production Goes Up

The set-up, as simple and inexpensive as it was, boosted production to 500 parts per hour—a 300% increase. In addition, the accuracy of this finishing process permitted the company to roll-cut their tubing, instead of square cutting, reducing the cut-off operation time by 300%!

The "multiple-use" value of Dumore Automatic Drill Units is still another benefit the customer gets. Its unique, simple mounting feature permits it to be quickly transferred and re-used for drilling, tapping, reaming and related operations throughout the shop, paying for itself over and over again.

Let Dumore's Application Advisory Service help you get increased production and lower costs on jobs like this. Write for FREE Dumore Application Analysis Kit.



Automatic Press Hand

Pulls parts from die presses at the rate of 30 strokes per minute—automatically. Mechanical press hand is particularly suitable for metal stamping departments in large manufacturing operations, as well as appliance manufacturing processes.

Mobile unit is ideal for job shops, since it can be moved from one press to another. Eliminates need for cutting special clearances for handling. Operates by compressed air, controlled by two simple switches, using 110 volts. In operation, hand travels in to pull part from press. Holding part under pressure, arm support moves back on sliding track. Hand releases part when rated stroke is reached. Support moves toward press to repeat entire process. Hand is self-contained. In three sizes with 24-, 36-, and 48-in. strokes.

Hamilton Automation, Inc. (Circle No. 2, Reader Service Card.)

3—Catalyst Exhaust Purifier can now be used on leaded gasoline. Eliminates 90% or more of carbon monoxide, most of aldehyde and hydrocarbon fumes in engine exhausts, allowing safe operation of inplant vehicles in enclosed areas. Easily installed. *Oxy-Catalyst, Inc.*

4—Plastic Coated Cable resists sunlight, oxidation; most acids, bases, salts, oils, greases. "Plasteel" is made of galvanized or stainless steel wire rope coated with tough, flexible plastic. Sizes (with coating), ⅛-⅜ in.; strengths, 480-7000 lb. *Macwhyte Co.*

5—Oil-Less Air Compressor delivers oil-free air. Ideal for pneumatic tools and control systems. Individual motor-driven units can be mounted right where air is needed, instead of using central station. 35, 75, 175 psi. continuous; ¼-¾ hp. *Bell & Gossett Co.*

6—Grinding Wheel is reinforced with fiber glass fabric. It's safe at operating speeds to 16,000 surface ft. per min. "Carboflex" wheels maintain peak efficiency at high speeds and temperatures, wear evenly, and retain high tensile strength. *Carborundum Co.*

7—Gate Valve has a renewable seat ring that can be replaced while valve remains installed in the line. Takes about 10 minutes, under all conditions, with a screwdriver only. Just disassemble bonnet; unscrew rings, lift out; slip in new rings, secure. *Fairbanks Co.*

8—LP-Gas Sweeper is ideal where gasoline exhaust is objectionable. Besides eliminating fumes, LP-gas prolongs engine life, reduces maintenance. Model 75-LP covers 48-in. path; capacity is 100,000 sq. ft. per hr.; holds 500-lb. dirt. *G. H. Tennant Co.*

9—Micro-Positioner automatically, accurately locates production parts under all types of vertical spindle machine tools. Controlled by marked steel tape; run by pushbuttons. Eliminates jigs, fixtures on small runs. *Micro-Positioner Corp.*

Turn the page

JAL-TREAD FLOORPLATE
THE SHORTEST DISTANCE BETWEEN

J&L STEEL

The straight-line pattern of J&L Jal-Tread raised cleats plus the strength and toughness of high quality steel combine to provide floor plate with both safety and economy.

Whatever your application . . . in new construction, new equipment or replacement, you'll find Jal-Tread offers you the shortest way to:

Safe Footing—300 miniature squares per square foot—all of uniform height—provide maximum linear friction surface, protect against lost-time accidents.

Easy Fabrication—The Jal-Tread straight line pattern simplifies welding, flanging, shearing, bending, punching, and drilling operations. Experience shows that Jal-Tread can be cold-formed on standard plate-bending machines.

Easy Cleaning—The Jal-Tread straight line gutter pattern permits quick, thorough sweeping and draining in any direction.

For safe, long-lasting flooring always specify J&L Jal-Tread . . . *it's available at leading distributors everywhere.*

see our catalog in SWEET'S ARCHITECTURAL FILE or write for copy

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

Clean ...Motors and Generators... Quickly, Efficiently, Safely with TURCO-SOLV

- **Far More Efficient** than stoddard solvent
- **Far Less Toxic** than carbon tetrachloride
- **Far Safer** than gasoline

Also ideal for a host of other plant maintenance cleaning jobs

Since the introduction of Turco-Solv three years ago, hundreds of industrial concerns have purchased and used this material for electrical equipment and plant maintenance cleaning. A true detergent action safety solvent, only Turco-Solv offers you an unchallenged combination of user benefits... safety, efficiency, speed and versatility.

It is from a continuous program of laboratory research, testing and development that comes the constant improvement of existing Turco materials, and the certainty that Turco will develop new products, as they are needed, through the tomorrows that lie ahead.

TURCO

TURCO PRODUCTS, INC.
Chemical Processing Compounds
6135 So. Central Ave., Los Angeles 1, Calif.
Factories: Newark, Chicago, Houston, Los Angeles
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Write for Booklet
"The Story of Safety Solvents"

Valuable booklet discusses all methods of cleaning electrical equipment and gives advantages of each.

Please Affix Coupon To Company Letterhead
TURCO PRODUCTS, INC.
6135 So. Central Ave., Los Angeles 1, Calif.
Please send me a copy of "The Story of Safety Solvents" without cost or obligation.

NAME _____

TITLE _____

F

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

10—Conduit Entrance Cap swings open, hangs safely out of way by loosening single screw. Wire easily pulled through, quickly pressure-clamped directly against wall; no threading or offsetting. "Swing Top" for rigid conduit, EMT; ½-2 in. *Electrical Fittings Corp.*

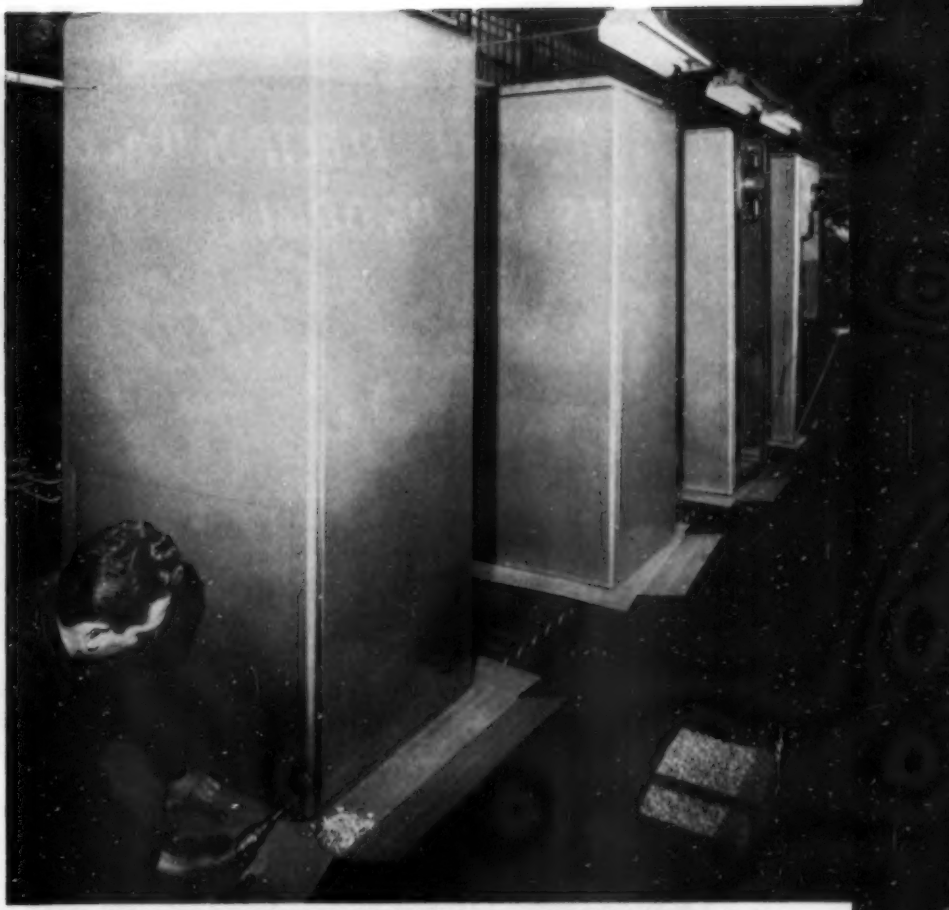
11—Portable Gas Detector is light, simple, compact. "JW-Sniffer" Model G is worn waist-high suspended by strap around neck for convenience. Weighs slightly over 4 lb. Uses ordinary flashlight batteries, replaceable without tools. *Johnson-Williams, Inc.*

12—"Man Cooler" Fan is for comfort cooling. Mounts anywhere; delivers 5600 cu. ft. air per min. When hung from ceiling girders or rafters, air flow provides circulation for considerable distance. Model M-24 operates quietly, economically. *McLean Engineering.*

Turn the page

RESULTS SHOW IMPROVED PRODUCTION

...with Phillips Cross-Recessed-Head Screws



ASSEMBLY LINE MIRACLES result from using Phillips cross-recessed-head screws in *all* Bryant Heater plants on heating, air conditioning and water heating units. Bryant's general assembly director says, "In all exterior or interior applications it is important that we use screws that incorporate easy assembly with rigid fastening — that means Phillips."

QUICK, EASY INSTALLATION applies equally to Fleetlite — "America's FINEST Windows" — and to the Phillips cross-recessed-head screws which assure sturdy, rigid, long-lasting *precision* construction. Says plant manager of Fleet of America, Inc., maker of these windows, "Phillips screws complement the high standards of our extruded aluminum construction. We use them exclusively."

"NEATER APPEARING RANGE through the design of the Phillips screw head," says Assistant Superintendent of Tappan Stove Co., Mansfield, Ohio, founded 1881. "In addition, these screws improve production, speed assembly — and offer several safety factors. They have gained the approval of the men who use them."

THE FASTENERS OF TODAY... AND OF THE FUTURE

✕ *marks the spot*

... the mark of extra quality

Allmetal Screw Products Company, Inc. • American Screw Company • Atlantic Screw Works, Inc. • The Blake & Johnson Co. • Central Screw Company • Continental Screw Company • The Eagle Lock Company • Elco Tool and Screw Corporation • Great Lakes Screw Corporation • The H. M. Harper Co. • The Lamson & Sessions Company • National Lock Company • The National Screw & Manufacturing Co. • Parker-Kalon Div. General American Transportation Corporation • Pheoll Manufacturing Co. • Rockford Screw Products Co. • Scovill Manufacturing Co. • Shakeproof Div. Illinois Tool Works • The Southington Hdwe. Mfg. Company Sterling Bolt Company • Universal Screw Company • Wales-Beech Corp.

LAMSON ELECTRONICALLY SORTS 18 PRODUCT LINES-

AT LEVER BROS.' Hammond, Ind. plant, a Lamson automatic sorting conveyor system operates 3 shifts per day . . . sorting 6 of 18 product lines at any one time. This system is the first of its kind . . . hung from the ceiling utilizing the air rights.

A Single Lamson Conveyor delivers cartons of soap and soap powder from the mixed manufacturing area to the warehouse . . . a considerable distance.

The sorting devices operate from this conveyor. Each sorting device consists of an electronic identifying mechanism and the mechanical diverting equipment. The identifying mechanism, similar to a scanning device, selects each carton by a pre-printed mark. When the mark changes the intensity of reflected light, it sets-up an impulse which identifies the carton to be deflected. This impulse actuates the mechanical diverting equipment which moves the carton sidewise onto a spur feeding a pallet loader.

Lamson engineering "know-how" has not only reduced manual sorting but allows a more efficient use of floor space. Whatever the size and type of your business, a Lamson engineered system can save you material handling time and reduce your costs. **Mail this coupon today!**

LAMSON 75th YEAR

Plants in Syracuse and San Francisco
Offices in Principal Cities

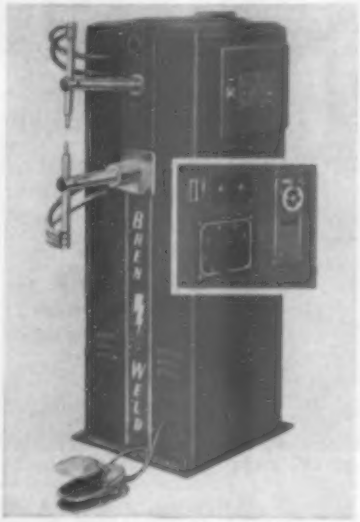
Lamson Corporation
3230 Lamson Street, Syracuse 1, N. Y.
Please send me additional information on the new Lamson Sorting Conveyor System.
NAME.....TITLE.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

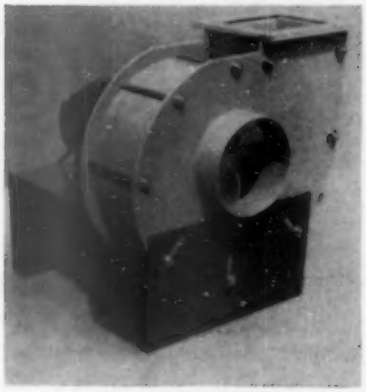
13—Luminous Ceiling is a complete, wired electrical package, combining light sources and ceiling as one. Entire system locks into prepunched steel structural member which can be fastened to, or suspended from ceiling. Electrician-installed. *Luminous Ceilings, Inc.*

14—Explosion - Proof Panelboard meshes cover, end plate, and body to form continuous metal-to-metal, explosion-proof seal. All inspection and maintenance from front. Two or more may be installed side by side on close centers. 2, 4, 6, 8 gangs. *Pyle-National Co.*



15—Spot Welder, 10 kva., features radial windings for maximum ventilation, long unit life. BREN/WELD SP-100 welds up to 2 pieces of ⅛-in. steel automatically. Switch eliminates need for adjustments when air pressure is changed. Price about same as standard 5-kva. unit. *Kasson Die & Motor Corp.*

For more about these products, circle item numbers on Reader Service card next to back cover.



16—Plastic Fans handle fume removal under severe corrosive conditions. "Rigivin" (rigid vinyl) is for strong acid or alkali fumes; maximum corrosion - resistance. "Rigidon" (glass - fiber reinforced plastic) is for most acids; to 200 deg. F. *Heil Process Equipment Corp.*

17—Pipeline Silencer removes 95-99% of noise created by pressure reduction in natural gas distribution and steam systems. Stops noise at source; installed in downstream piping close to valve. Eliminates need for pipe lagging, sub-surface burying. *Burgess-Manning Co.*

18—Live Storage Rack has free rolling ball-bearing wheels. Packages loaded in rear roll forward to stop in front. Can be combined with feed conveyors from carton sealing machinery, discharge conveyors to truck or rail siding to provide flow system. *M-H Standard Co.*

Turn the page

The Only "Stand-Up" Gas Operated Lift Truck On The Market

The Mobilift "stand-up" fork lift truck speeds materials handling where handling is toughest—provides maximum return under these critical conditions.

1. Cramped quarters where top maneuverability is demanded.
2. Narrow aisles where storage space is at a premium.
3. Operations where driver is constantly on and off truck.

One step up and he's ready to go . . . faster and safer. He can turn Mobilift end-to-end without stopping . . . thanks to 360° steering. Lev-R-Matic controls and automatic safety brake provide easy and positive drive control of the truck at all times.

The driver enjoys safer operation with unobstructed "every-side" visibility. A high free lift for higher, easier stacking is standard.

Mobilift "stand-up" fork lift trucks range up to 3500 lbs. in capacity.

Discover how you can save material handling time and costs. Mail this coupon today.

Lamson Mobilift Corporation
5210 Lamson Street, Syracuse 1, N. Y.
Please send me complete information on
Mobilift "stand-up" trucks ..... on Mobilift
"sit-down" trucks, on ..... all Mobilift trucks.
Name ..... Title .....
Company .....
Address .....
City ..... Zone ..... State .....

LAMSON
MOBILIFT
MOBILIFT CORP.
Home Office
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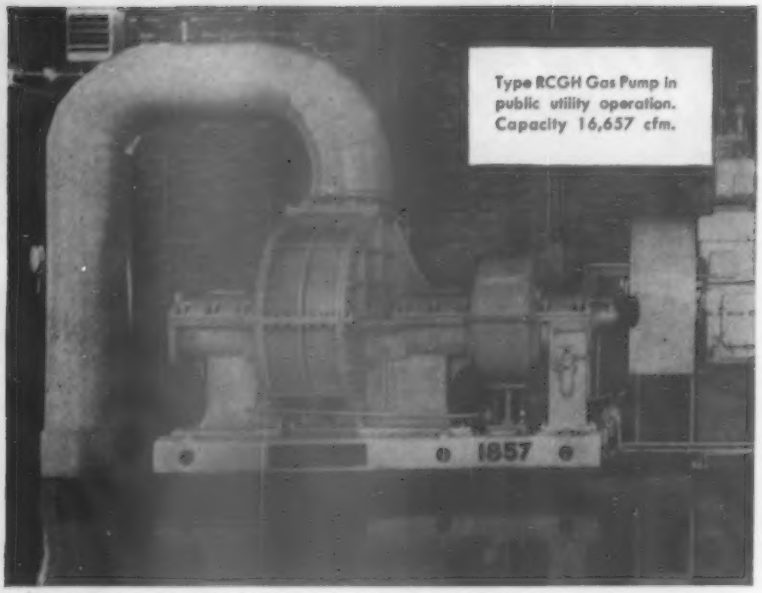
Offices in principal cities



PERFORMANCE OF R-C GAS PUMPS ASSURED BY "BIG 4" ESSENTIALS

CHECK THE "BIG 4" ESSENTIALS

1. *Positive flow*—because of positive displacement principle maintaining the quantity of delivery
2. *Pressure*—controlled to your requirements
3. *Capacity*—always up to ratings, with moderate short time overloads
4. *Economy*—in first cost, power and low maintenance

You may find it profitable to compare your present gas pump performance with R-C proved economy and reliability.

For delivering or exhausting gas in industrial operations, R-C Gas Pumps and Exhausters, in either the Rotary Positive or Centrifugal types, have long demonstrated their complete reliability, efficiency and economy.

For many years, they have been the choice of plant engineers and of leading builders of industrial equipment, where the movement of gas is an essential part of the process.

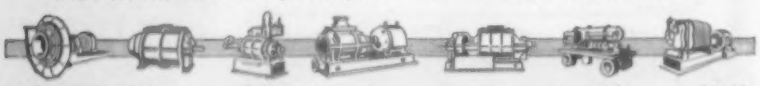
Capacities from 5 cfm to 50,000 cfm at moderate pressures offer close selections for specific needs . . . and further economies are gained from compactness, reducing space requirements and installation costs.

For any present or future project requiring gas pumps or exhausters, ask us for details on R-C equipment, and for help in planning your installations.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.
10. Central Ave. • Connersville, Indiana

Roots-Connersville Blower (Canada) Ltd. • 629 Adelaide St. W., Toronto, Ont.



Centrifugal and Rotary Positive Blowers and Exhausters • Positive Displacement Meters • Vacuum Pumps • Gas Pumps • Inert Gas Generators • Spiraxial Compressors

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

19—Roll-Over Vacuum Sheet Lifter rotates 2000-lb. sheets 180 deg. Load cannot drop, as it's not dependent on vacuum when inverted. Rotation may be stopped at any angle from horizontal to 180 deg. for easy inspection, vertical stacking. *F. J. Littell Machine Co.*

20—Paint Spray Conversion Gun changes high pressures which cause backspray, overspray, spraydust, to Volumair system of atomization by air volume — at rate of 50 psi., 6 cfm. to 1½ psi., 60 cfm. Eliminates needs for masks, goggles, spray booths. *Roxon, Inc.*

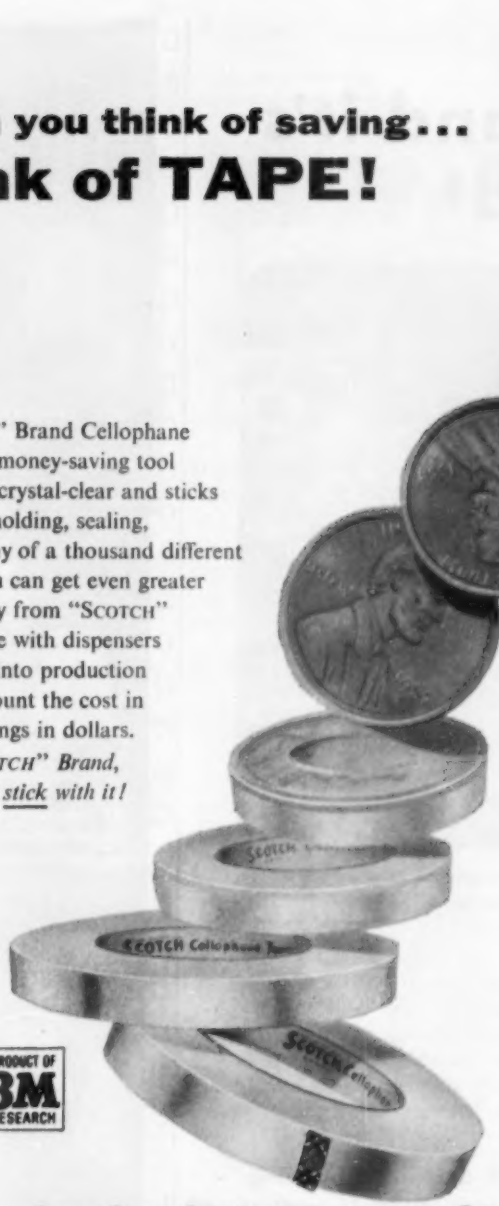
21—Heater on Wheels is small, lightweight (78 lb.). Use it on scaffolds; carry up and down stairs; in any spot that's too small for conventional size heater. Capacity is 100,000 Btu. per hr. Carries fuel for 12 hr.; burns kerosene, #1 or #2 oil. *Master Vibrator Co.*

Turn the page

When you think of saving...
think of TAPE!

Famous "SCOTCH" Brand Cellophane Tape is a time-saving, money-saving tool all over the plant! It's crystal-clear and sticks at a touch. Use it for holding, sealing, joining, protecting—any of a thousand different jobs. What's more, you can get even greater versatility and economy from "SCOTCH" Brand Cellophane Tape with dispensers that turn manual jobs into production line operations. You count the cost in pennies; figure the savings in dollars.

Always specify "SCOTCH" Brand, the quality tape . . . and stick with it!



CELLOPHANE TAPE

. . . one of more than

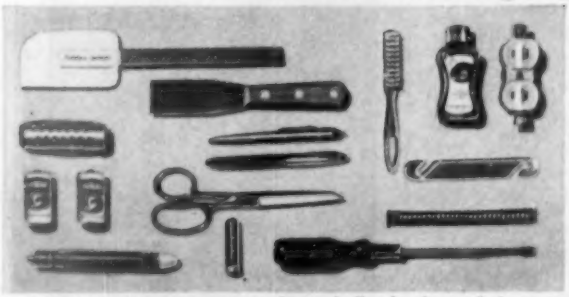
300 Pressure-Sensitive Tapes

for industry, trademarked . . .

REG. U.S. PAT. OFF.

SCOTCH BRAND

Look what you can do with it!



IF YOU MAKE OR PACKAGE products similar in size and shape to these, you can card them quickly, easily, economically. New semi-automatic "SCOTCH" Brand Tape Stapler, using "SCOTCH" Brand Cellophane Tape, does it at production-line speeds—up to 80 items a minute. Tape "staples" will not scratch or mar surfaces.

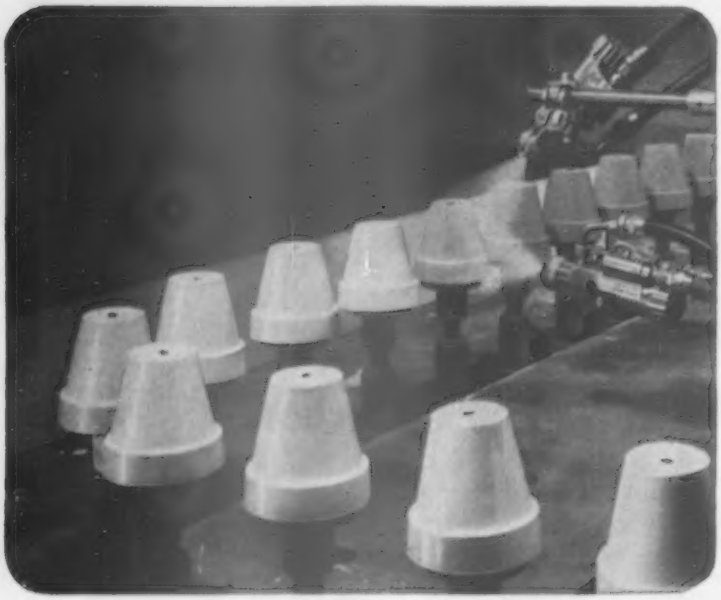
TAPE STAPLED items, such as this lipstick tube, come out of machine fastened securely to card, which may be any size to allow for printed sales message.

SEND FOR information sheet describing Tape Stapler, with descriptive folder on "SCOTCH" Brand Cellophane Tape. Just write on your letterhead: Dept. CO-105.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

© 3M Co., 1955.

Phffft...and it's painted!



DeVilbiss automatic spray machine ups painting production. Example: finishing 3¼" O.D. flower pots up to 3600 an hour.

Just load your product or part on a high-speed DeVilbiss spray machine, and *phffft* . . . it's painted – automatically! And with the highest degree of uniformity! Split-second timing, accurate gun positioning, and synchronized conveyor speeds prevent streaks, sags, and wasteful overspray. You actually *save* materials, as you produce consistently better finishes in a fraction of the time consumed by manual methods.

Know in advance the savings of automatic painting

DeVilbiss offers automatic spray machines for painting products of practically any size or shape, and for use with most conveyor systems. To have us run a test on your product and report savings *before you invest a cent* – send us full data about your product, coating applied, number of coats, and production rate desired.

THE DEVILBISS COMPANY, Dept. 331, Toledo 1, Ohio

Santa Clara, Calif. • Barrie, Ontario • London, England

Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY

DEVILBISS

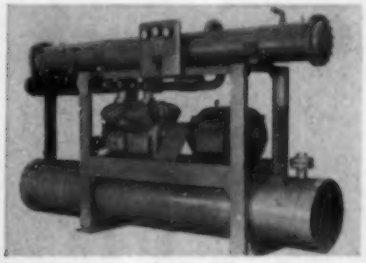
With spindles six inches apart, chain-on-edge conveyor moves unpainted pot in position.
At precise instant, two guns spray with overlapping patterns as pot revolves three times.
Painting takes one half second. If spindle is empty, machine skips it, guns don't spray.
Finished pot moves as next one automatically takes position. Total cycle lasts one second.

For more about these products, circle item numbers on Reader Service Card next to back cover.

22—Tiering Truck, walkie type, electric, has hydraulically extendable forks. "HydraFork" does not straddle loads. Forks extend into pallet, lift load, retract into truck. Stroke of forks is 24 in. Available in both 2000- and 3000-lb. capacity models. *Lewis-Shepard Products, Inc.*

23—Drill weighs only 3¼ lb., yet develops 1500 rpm. at chuck, resulting in increased torque. "Mighty Midget" is compact, easy to handle in close quarters. Pistol-grip handle, three-jaw geared chuck with chuck key, and concealed but easily accessible brushes. Model No. 236. *Stanley Electric Tools.*

24—Corrosion - Resistant Heater is ideal where high-pressure steam, make-up water get into system. Condensers are coated with finish resistant to salt air, humidity, mild acid or alkali atmospheres. Available without motors to replace condenser-failed units. *Modine Manufacturing Co.*



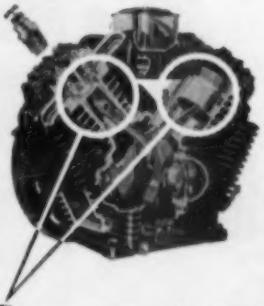
25—Packaged Water Coolers for air conditioning and process refrigeration are factory-assembled; installed with a few simple water and electrical connections. 12 models, 5-125 hp. 25- to 75-hp. sizes small enough to pass through average size doorway. Compressor parts easily replaced. *Carrier Corp.*

26—Jet Pump Motor, fractional hp., features totally enclosed canopy housing that protects parts from dirt, insects, rodents. Vent slots in main frame of motor provide ventilation. Ball bearings out of air stream, preventing grit contamination. Single- and 3-phase, 1/3 to 2 hp. *A. O. Smith Corp.*

27—Production Tack Cloth removes lint, dust, abrasive grain, metal, paint particles in finishing and refinishing operations. Picks up and holds unwanted particles, preventing spreading, scattering. Spontaneous combustion-proof cloths are 18x36 in. *Permacel Tape Corp.*

Turn the page

Low-friction design gives you up to 22.6% more air



Five important design features reduce friction in DeVilbiss air compressors: (1) shorter piston stroke, and (2) slower piston travel cut down wear, provide greater air output; (3) ball-bearing-mounted crankshaft runs free of vibration at all speeds; (4) metered oil feed to all bearing surfaces insures proper lubrication; (5) piston pins are full-floating for low friction.

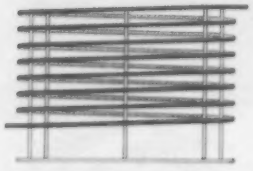
This low-friction design is one of the reasons DeVilbiss compressors are so efficient. Tests show that DeVilbiss compressors bring you up to 22.6% more air per power dollar – often pay for themselves in power savings alone. And you'll appreciate the lower maintenance and depreciation costs.

Can you take advantage of these savings? See your DeVilbiss jobber for a complete analysis of your compressed-air needs today.

THE DEVILBISS COMPANY
Toledo, Ohio
Santa Clara, Calif. • Barrie, Ontario
London, England
Branch Offices in Principal Cities

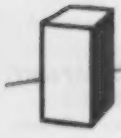
FOR BETTER SERVICE, BUY
DEVILBISS

To prevent production interruptions, this ingenious live storage spiral conveyor accumulates parts to compensate for stops and starts on the production line.



"Imagination" is an important element in solving the materials-handling problems created by modern, high-speed production methods. Equally important is the engineering "know-how" to put these imaginative ideas to work in a practical way.

You'll find both of these abilities at ALVEY Conveyor Manufacturing Company. Designers and engineers are trained to let their imaginations soar ... yet always keep their solutions sound and practical. We will be happy to have an ALVEY engineer visit your plant, study your operation and make suggestions for better conveyor mechanisms to handle packaged goods. Simply write.



Every time you MANhandle a product, you add to its cost ... without adding to its value.

So, for profit's sake ... convey your packages.

ALVEY

ALVEY CONVEYOR MANUFACTURING COMPANY

9347 Olive Street Road, St. Louis 24, Missouri

Branch Offices in Principal Cities

189

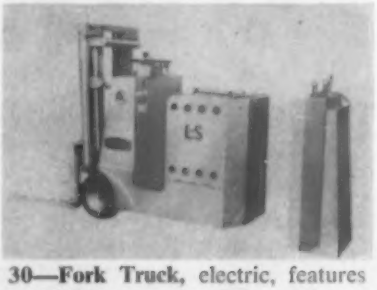
FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

28—Paint Line Markers make stripes of 2-6 in. Handle plain or reflective materials efficiently. Compressor (9-cfm.) delivers air at 80 psi. with 50% reserve. Many available accessories for Models 8 and 8T "Reflecto-Liners" increase versatility. *Walt Industries, Inc.*

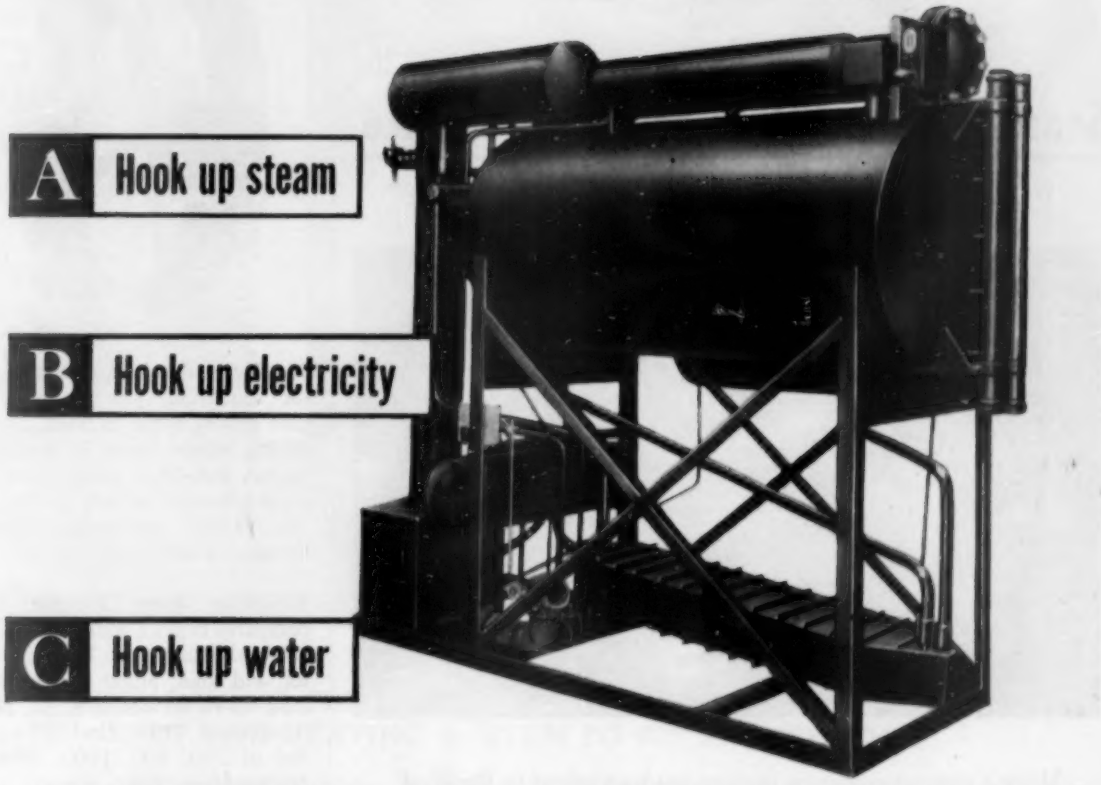
29—Aluminum Welding Cable weighs half as much as copper, costs less, is flexible. Grade "SR" with synthetic rubber jacket is for normal use. Grade "N-60" with 60% neoprene jacket reinforced with rayon braid is for rough use. 4-4/0 sizes. *Tweco Products Co.*



30—Fork Truck, electric, features a 1325-lb. counterweight easily attached to rear of truck. With counterweight, "MultiMaster" capacity is 4000 lb. at 48-in. load length; without, 2000 lb. Stand for counterweight available. *Lewis-Shepard Products, Inc.*

Turn the page

NEW! Servel water chiller is easy to hook up as A B C



Now! Servel offers you a package water chiller, complete and ready for installation.

Simply hook up steam supply and return to operate absorption refrigeration unit. Connect electricity, 115-volt AC, to operate controls. Then connect chilled water and condensing water systems.

All operating and safety controls are engineered specifically for Servel water chillers and installed at the factory. This eliminates the necessity of control design engineering and local procurement of special controls.

Capacity of water chiller is modulated to meet your needs up to a full 25 tons. Equipment is controlled to assure peak efficiency for lowest operating cost.

Servel water chillers are now serving industry by

Dissipating heat of process machines:
Rubber mills and mixers, wax mills, printing equipment

Removing heat of chemical reactions:
Anodizing, electroplating

Condensing volatile chemicals:
Soya bean processing, natural gas producers

Cooling product after processing:
Canning factories, bottling plants

Temperature and humidity control:
Sugar refineries, printing plants, textile mills, precision machining

Comfort air conditioning:
For factories and offices

Servel

the name to watch for great advances in

AIR CONDITIONING ✓ REFRIGERATION

SERVEL, INC., Dept. FM-105, Evansville 20, Indiana

Please send me specifications and full information on new water chiller with packaged control.

Name_____

Firm_____

Address_____

City_____ Zone_____

County_____ State_____

"doodles" or complete plans?

Whichever you have

Standard's complete conveyor service can save you money!

Many a complex conveying problem has been solved by Standard engineers with only a customer's "doodle" drawing to follow. And often when complete plans are submitted, Standard engineers make recommendations that improve the conveyor application . . . save time and money as well.

If you prefer to do your own conveyor planning, we suggest you send for Bulletin 63-D. Here in 28 fast-reading pages you get all the specifications, drawing and application data on a wide range of Standard Conveyors. This includes gravity and power conveyors and accessory equipment: Handidrive pre-built conveyor units and the complete, self-contained portable conveyor units listed below.

Call your Standard Conveyor representative listed in your classified phone book — or send for copy of Standard General Catalog — address Dept. FM-105

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul 9, Minnesota
Sales and Service in Principal Cities

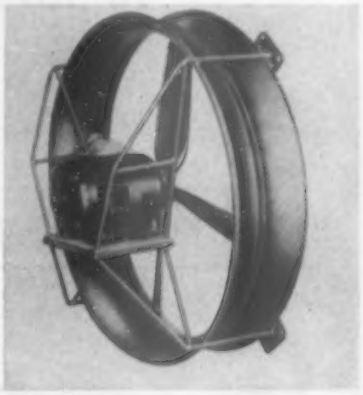
Nearly 50 years of conveyor experience

Standard

GRAVITY & POWER Conveyors
ROLLER • SLAT • WHEEL
SECTIONAL • BELT • CHAIN • PUSH-BAR
PORTABLE CONVEYOR UNITS:
HANDIBELT • INCLINEBELT • EXTENDOVEYOR • UTILITY BELT-VEYOR
HANDIPILER • LEVEL BELT • LITEWATE • HANDIDRIVE
PNEUMATIC TUBE SYSTEMS

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.



31—Reversible Fan, double ring, is for ventilating jobs requiring intake during some periods, exhaust during others. Made in direct-connected, belt-drive, pulley-drive, and extension-shaft models in 28-, 36-, and 44-in. diameters. *Hartzell Propeller Fan Co.*

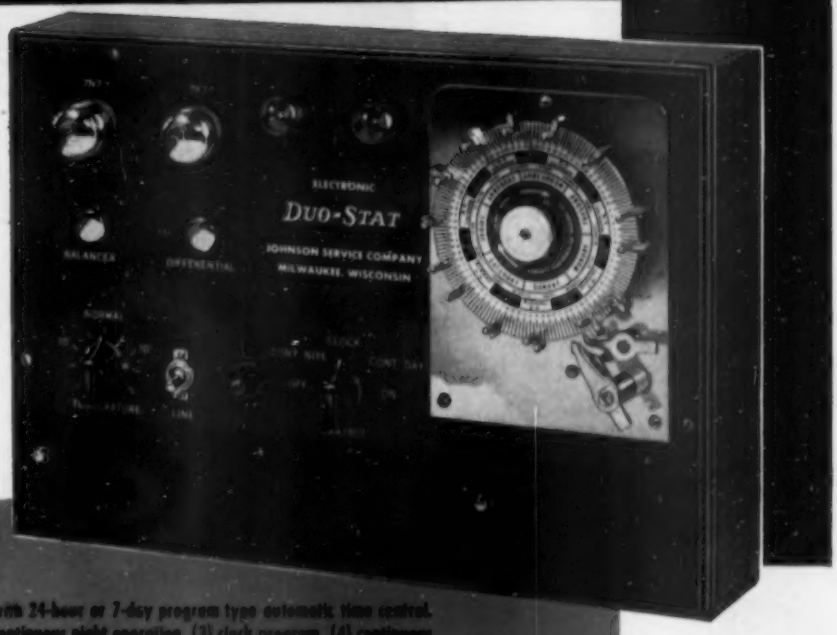
32—Wire Rope Electric Hoist compares in price with electric chain hoists. Features two brakes — motor and load; either will hold full load. 10-ft. lift standard; 14, 18, 20 ft. optional. "P&H Zip-Lift" capacities of 250, 500, 1000, 2000 lb. *Harnischfeger Corp.*

33—Puller is a 100-ton giant with triple grip for tough pulling jobs on large-diameter wheels, sheaves, sprockets, gears, etc. 34½-, 36½-, and 38-in. reaches for maximum diameters of 48, 36, 24 in. Hydraulic ram (power) removable for other jobs. *Owatonna Tool Co.*

Turn the page

STOP FUEL WASTE!
CUT HEATING COSTS...

with
JOHNSON
ELECTRONIC
Duo-Stats



T-386 Clock Model Electronic *Duo-Stat* with 24-hour or 7-day program type automatic time control. Five-position switch for (1) heat off, (2) continuous night operation, (3) clock program, (4) continuous day operation or (5) heat on. Complete with pilot lights and cabinet for flush or surface mounting.

FUEL-SAVING PRIMARY CONTROLLER *CHANGES THE SIZE* OF THE HEATING SYSTEM *TO FIT THE WEATHER*

Your heating system is sized to combat the *coldest* weather. But most of the time, all you *really* need is a *part* of its capacity.

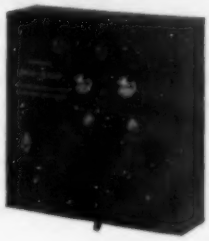
With a Johnson Electronic *Duo-Stat*, it's a simple matter to balance your heat supply against outdoor temperatures. This modern weather-compensated controller automatically reduces the capacity of the heating system in mild weather, allowing full capacity operation only during severe weather. The result is BIG FUEL SAVINGS because most of the time you are using only a portion of total heating capacity.

Here's how the *Duo-Stat* works: (1) it senses outdoor temperature; (2) notes the temperature of the heating system; (3) "telegraphs" to the source of heat the proper relationship between those two temperatures; and (4) controls the automatic firing device or a valve on the heat exchanger or boiler. In larger buildings, a separate *Duo-Stat* in each zone operates a valve in a branch heating main.

Installation is simple and inexpensive, with wide flexibility to satisfy the needs of all types of buildings and heating system arrangements. Hundreds of buildings save 25 per cent and more on fuel costs with Johnson Electronic *Duo-Stats* . . . let a nearby Johnson engineer explain their many superior features to you soon.

JOHNSON CONTROL
TEMPERATURE AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885



T-385 Standard Electronic *Duo-Stat* with indicating lights and 3-position switch marked "Off—Auto Control—On". Cabinet for flush or surface mounting.

JOHNSON SERVICE COMPANY
507-P East Michigan St., Milwaukee 2, Wisconsin

I'm interested in fuel savings. Please send Bulletin T-385 containing operating details, specifications and application data on Johnson Electronic Duo-Stats.

NAME _____

ADDRESS _____

CITY & STATE _____

Ask these questions, too, when you judge a fluorescent lamp . . .

Is it made with Halo Phosphor?

No other phosphors in use today can match Halo Phosphors for maintaining high light output and original color. Westinghouse (and only Westinghouse) uses Halo Phosphors throughout its entire fluorescent lamp line.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

How about quality control?

From raw materials to finished product, every Westinghouse fluorescent lamp is subjected to *480 inspections and tests* before approval for shipment.

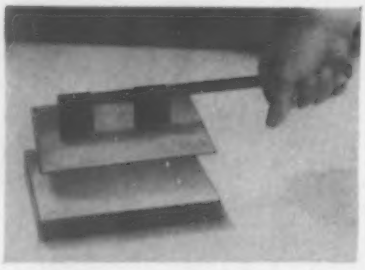
For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

YOU CAN BE SURE...IF IT'S

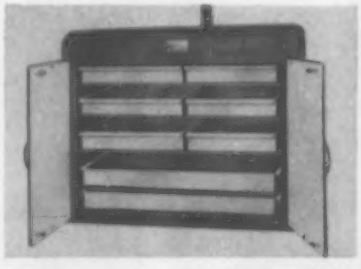
Westinghouse

For more about these products, circle item numbers on Reader Service card next to back cover.

34—Electric Cars include ½-ton capacity "Pick-Up" model (shown above), ¼-ton capacity "Courier" for messenger service, "Executive" for personnel transport; 1/3-ton capacity "Freight-A-Way" for low-cost handling of many hauling jobs. All use electric battery power. *West Coast Machinery, Inc.*



35—Magnetic Hand Tool picks up sheet steel, blanks, or formed parts, hot or cold metals; holds them for feeding. To release, tool is turned slightly to either side. Magnetic strength increased or reduced by positioning grippers anywhere along bar. Unlimited magnet life guaranteed. *Multifinish Mfg. Co.*



36—Oven is small-sized (30-in. wide, 25-in. deep, 24-in. high) for drying plastic granules, parts after cleaning, loose materials, etc. Uniform temperature (to 325 deg. F.); motor located outside unit to eliminate stratification; adjustable damper. *Grieve-Hendry Co.*

37—Oil Dispenser and Sump Cleaner removes sludge, chips, oil from machine tool sumps, filters out waste, delivers fresh oil to tool. Capacity of 75 gal. for fresh oil, 75 gal. for waste, enables one person to clean and re-oil in one operation. *Coolant Equipment Corp.*

38—Rotating Fork Attachment transports and dumps bins of various sizes. Spread of forks adjustable 20-50½ in. Rotator turns load 360-deg. either direction. Clips on truck with no bolting. Doesn't affect tilt or maximum fork height of truck. On 10,000-lb. truck, it handles 8000 lb. *Yale & Towne Mfg. Co.*

39—Carton Sealer uses low-cost liquid glue. Dispenses adhesive in even coat to any size area. Seals cartons more securely than gummed tape or staples, neatly, safely. Useful for pasting on ungummed labels. Weighs 5 lb. when filled with 1 qt. adhesive. *Ever - Seal Industrial Glues, Inc.*

Turn the page

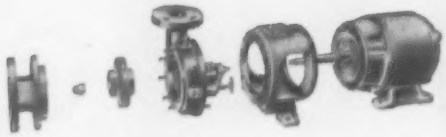
how to judge a fluorescent lamp . . . point no. 2

ask about **HIGHEST LIGHT OUTPUT**

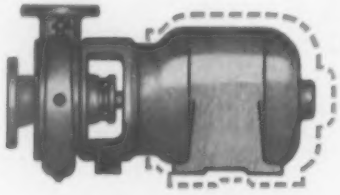
Fluorescent lamps deficient in light output are apt to be costly at any price. Reason: in order to attain a given light level with such lamps, you need not only more of the lamps themselves, but also—to hold and operate the extra lamps—*more fixtures and more power*. Thanks to a steady stream of new ideas in its fluorescent lamp design, materials and manufacture—ideas carefully evaluated through photometric testing as shown above—Westinghouse now offers you fluorescent lamps conservatively rated for light output at up to *63 lumens per watt*.

YOU CAN BE SURE...IF IT'S Westinghouse

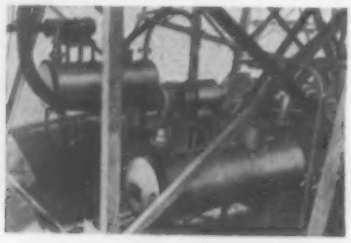
Q.E.D...which was to be demonstrated



Quality of Ingersoll-Rand Motorpumps is evidenced in the extra-heavy, extra compact design and construction shown above. From suction to discharge a Motorpump is built to the highest standards that can be established.



Efficiency is shown by smaller motor hp required to drive the I-R Motorpump. The impeller is precision balanced for peak performance. Design permits short shaft to eliminate deflection and whip. From packing to pump-casing, parts are engineered to make a smooth operating machine that delivers the goods—on every job.



Durability is proved by the illustration above. These I-R Motorpumps were installed 4 years ago and paid for themselves in the first 90 days of service. Service is both rugged and continuous, yet, in all this time, there has been no maintenance downtime.

MOTORPUMP

Write:

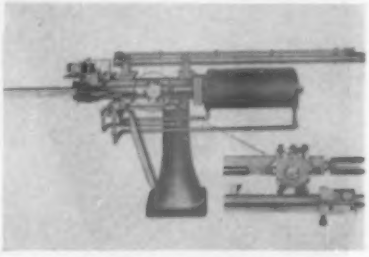
Ingersoll-Rand

9-220 11 Broadway, New York 4, N. Y.

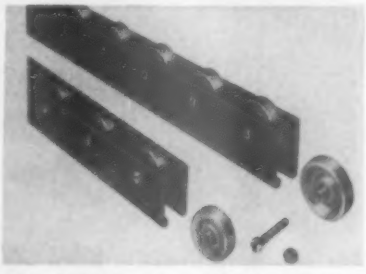
FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

40—Vacuum Forming Machine features completely automatic roll-feed, enabling continuous forming of parts. Since no operator is needed, it's possible to synchronize cutting equipment; filling, covering, trimming machines. Speeds of 4 cycles per min. *Auto-Vac Co.*



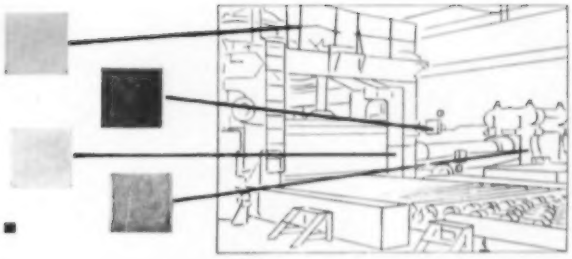
41—Tube Bending Machine has a turret attachment which can be set to make a number of different angle bends automatically without any manual manipulation. Turret has six stations; more or less can be furnished. Makes 1000 bends per hr. *Paul Machine Tool Co.*



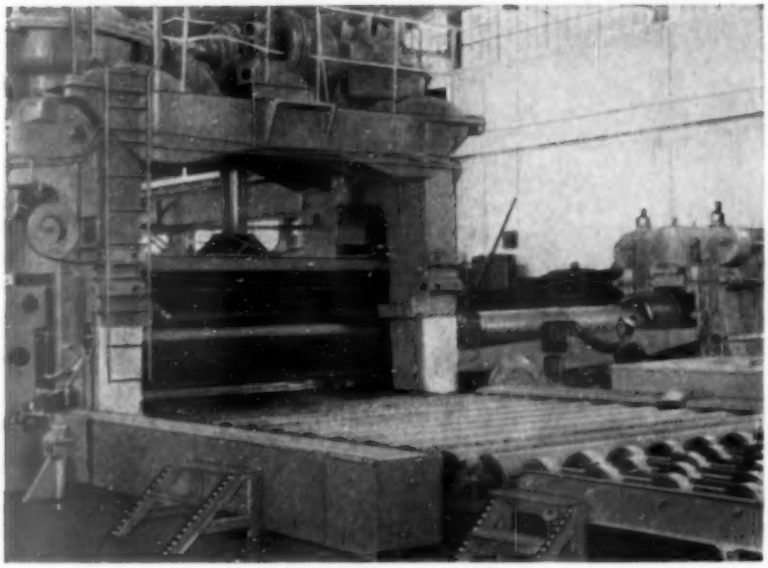
42—Strip Conveyor is a lightweight, gravity wheel type. Can be used with other conveyors, mounted on stands, laid on floor, set on work benches. 10-ft. section of "Flow Track" with supports on 5-ft. centers distributes load capacity of 400-750 lb. *Rapids-Standard Co.*

Turn the page

By using
the right colors
in the right places...



DU PONT COLOR CONDITIONING



increases production, boosts morale, promotes safety!

EVERY DAY, the value of Du Pont Color Conditioning is being proved over and over again in hundreds of industrial plants, office buildings, hospitals, apartment buildings, schools, restaurants and stores.

In work areas and offices, Du Pont Color Conditioning increases the rate and quality of production . . . reduces accident rates by improving visibility and pointing up danger zones. In cafeterias, wash rooms and recreation areas, Color Conditioning creates a cheerful, inviting atmosphere . . . makes for better employee relationships. And in schools and hospitals, restaurants, and stores, Color Conditioning puts color to work to make people see better, feel better and work better.

Du Pont Color Conditioning costs no more than ordinary maintenance painting; it actually costs less in the long run. And new paint formulas make Color Conditioning Paints *odorless* during application! Now you can put this scientific painting plan to work for you without the annoyance so often caused by paint odors. Discover the many ways Du Pont Color Conditioning can pay off for you. Mail the coupon today!

FREE 32-PAGE BOOK! *Find out how Color Conditioning can meet the specific needs of your building interiors. Get this book, illustrated in full color. Mail the coupon today!*

Du Pont Color Conditioning Paints Are Now Odorless

Now you can paint busy areas without interrupting normal routine

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

E. I. du Pont de Nemours & Co. (Inc.)
Finishes Division, Dept. F-510
Wilmington 98, Delaware

Gentlemen:

Please send me, at no extra cost, your 32-page book, "Du Pont Color Conditioning."

Name_____

Title_____

Address_____

City and State_____

are man-hours slipping through your fingers?

P-A-X "inside" communication cuts this loss

P-A-X provides instant, person-to-person communication, anywhere within your organization.

When your people are walking about to exchange information, they're *wasting time.* What you need is a P-A-X Business Telephone System, to provide communication—in *seconds*—between all parts of your plant. The P-A-X system makes it easier to supervise and coordinate all operations, and maintain top efficiency.

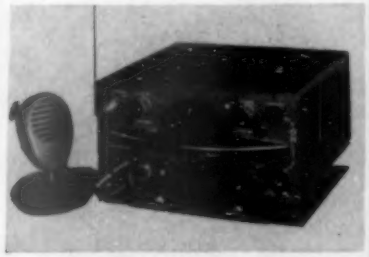
Rent-free P-A-X systems are privately owned and controlled—your own maintenance men install and move P-A-X telephones as you wish. Entirely separate from the public telephone system, P-A-X gives you lightning-fast service, always—no matter how busy the city switchboard may be.

Discover how other companies similar to yours are saving time and increasing efficiency, with a P-A-X Business Telephone System. For an actual "on-the-job" case study, *write:* Automatic Electric Sales Corporation (HAymarket 1-4300), 1033 West Van Buren Street, Chicago 7, Illinois. *In Canada:* Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

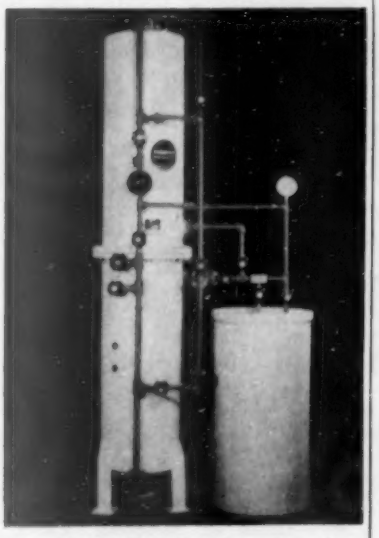
AUTOMATIC ELECTRIC

ORIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

For more about these products, circle item numbers on Reader Service card next to back cover.



43—Two-Way Radio operates from 6-, 12-, 24-volt d-c or 115-volt a-c sources without separate power supply. Compact Model J Pak-Fone may be used in mobile equipment, as base station, or portable unit (with 12-volt aircraft-type battery). *Industrial Radio Corp.*



44—Mixed-Bed Demineralizer is a compact unit for small quantities of water, to 360 gal. per hr. Produces water of low total dissolved solids, low CO_2, low silica content, low conductivity. Flow rate is 6 gpm.; kilograin capacity, 24,000 grains. *Permutit Co.*

45—Crate and Carton Clamp is a hydraulic attachment with rotator and side shifter. Handles crates and regular cartons 28-74 in. high; capped cartons 32-78 in. high. Bottom forks covered with abrasive coating; top plate with adjustable spikes. *Yale & Towne Mfg. Co.*

Turn the page

According to tests completed recently, this new switch not only meets but exceeds the rigid requirements set up by Underwriters Laboratories for AC switches. It may be used at *full rated capacity* on fluorescent loads at voltages from 120-277 v., on inductive loads (120-277 v.), on incandescent lamp loads, and on resistance loads for heaters, etc. In addition, it is highly practical for motor loads (120-277 v.) at 80% of current switch rating.

A feature of the new switch is the silver alloy contacts which prevent corrosion and hold temperature rise to an absolute minimum. Units may be used with any standard switch plate.

Withstands Inductive Loads at Full Rating
The economical answer for 277-volt instant-start slimline single-pin base fluorescent systems.

Withstands Inrush Loads at Full Rating
Inrush factor at least 8 times full rating of switch.

Withstands Resistance Loads at Full Rating
Silver alloy contacts hold temperature rise to a minimum.

Withstands Motor Loads up to 80% of Switch Rating
Practical for the control of motors and can be used up to 80% of rated capacity of the switch at 120-277 volts.

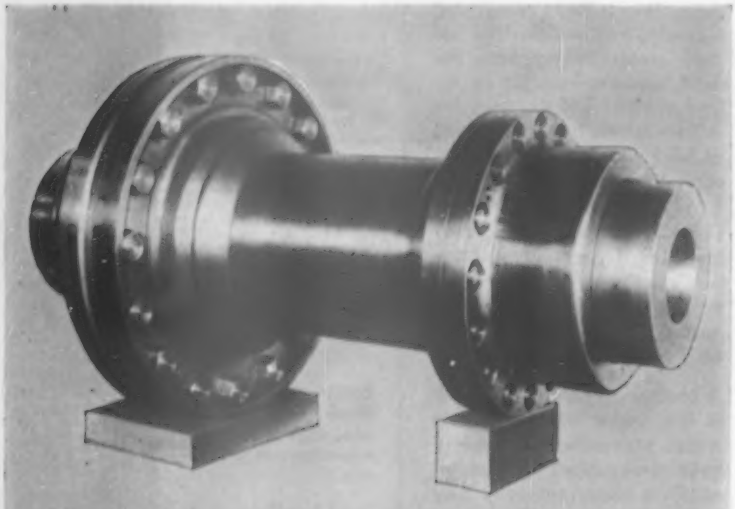
Write for complete information today.

Highest Grade
HEAVY DUTY
WIRING HUBBELL DEVICES

HARVEY HUBBELL, Inc.
DEPT. FM
BRIDGEPORT, CONNECTICUT

1800 lbs.

...is the weight of this SPECIAL forged steel insulated spacer WALDRON GEAR COUPLING



Despite its size and weight, it is in perfect dynamic balance.

The compressor or driven end is a size 8 gear half with the hub taper bored. The main motor, or drive end, is a size 6 gear half with the hub straight bored. The forged steel spacer is 24" long.

The coupling will connect a 14,000 H.P. synchronous motor to an axial compressor. 18,000 maximum H. P. will be transmitted at 3,600 R. P. M.

This special insulated coupling is only one of many special units which we design and make.

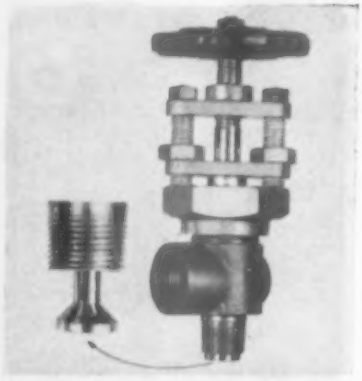
We invite your inquiries regarding couplings to successfully solve your particular problem. No obligation.

JOHN WALDRON CORPORATION
New Brunswick, N. J.
Since 1827

Sales Representatives In Principal Cities

For more about these products circle item numbers on Reader Service card next to back cover.

46—Time Delay Relay obtains an electrical interlock in a circuit, allowing pushbutton control, by an instant-action auxiliary switch. Model NEL Agastat provides intervals of 0.1 sec. to 10 min. or more. 5 models; a-c or d-c. *Elastic Stop Nut Corp. of America.*



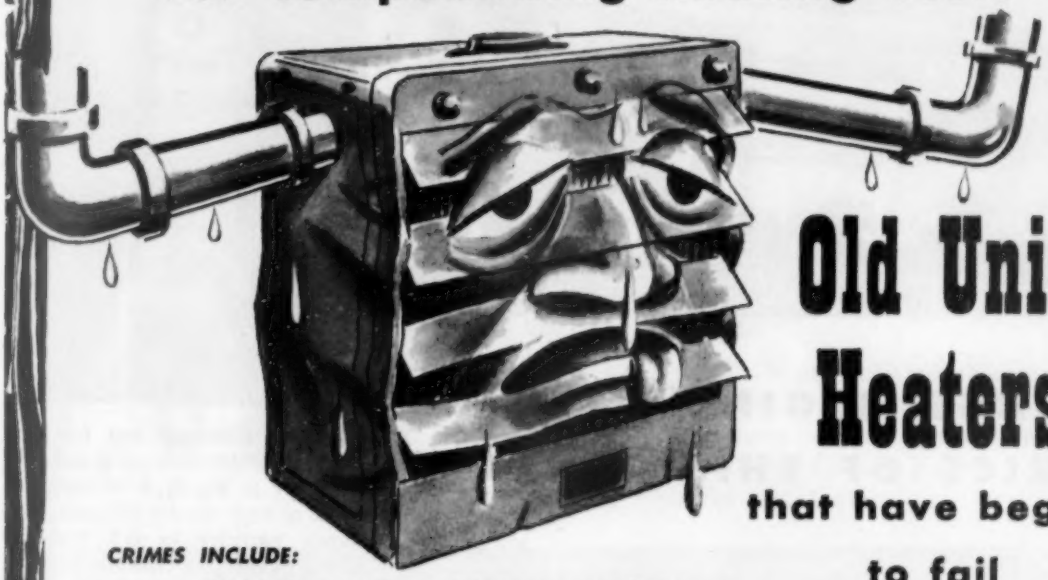
47—Drain or Sampling Valve is self-draining; valve stem seats outside body. Ideal in high-temperature or corrosive conditions where it's desirable to have valve seat inside wall of vessel to prevent liquid from remaining in nipple and valve. *Jerguson Gage & Valve Co.*

48—Automatic Ejector reduces maintenance of air tanks by removing water, oil, carbon, sludge. Easily installed. Doesn't affect or interfere with operation of equipment. Operates on pressure from governor or unloaded line. Aluminum with nylon seats. *George Mfg. Co.*

Turn the page

WANTED

for compounding heating costs



Old Unit Heaters

that have begun to fail

CRIMES INCLUDE:

- **Stealing costly maintenance man-hours**
- **Production holdups**
- **Grand larceny of heating efficiency**

REWARD Modine's new liberal exchange plan

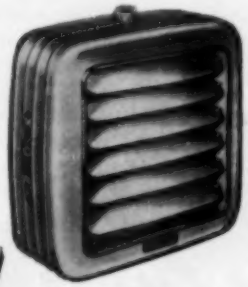
To protect you against the costs and hazards of obsolescence, Modine has established a liberal exchange or trade-in plan. It provides for the exchange of old unit heaters for new Modines at a favorable cash allowance. Now is the time to take advantage of this plan and be ready for the coming heating season.

It pays to standardize, too

Yes, leading industrial firms have found that they get additional savings when they standardize on Modine Unit Heaters as a result of (1) simplifying purchasing and installation; (2) speeding routine servicing; (3) having the wide-spread parts interchangeability.

NEW FREE BOOKLET DETAILS REPLACEMENT PLAN

Before you repair or replace any unit heater, get the booklet — "A UNIT HEATER EXCHANGE PLAN". Ask your representative . . . or write to Modine Mfg. Co., 1505 DeKoven Ave., Racine, Wisconsin.

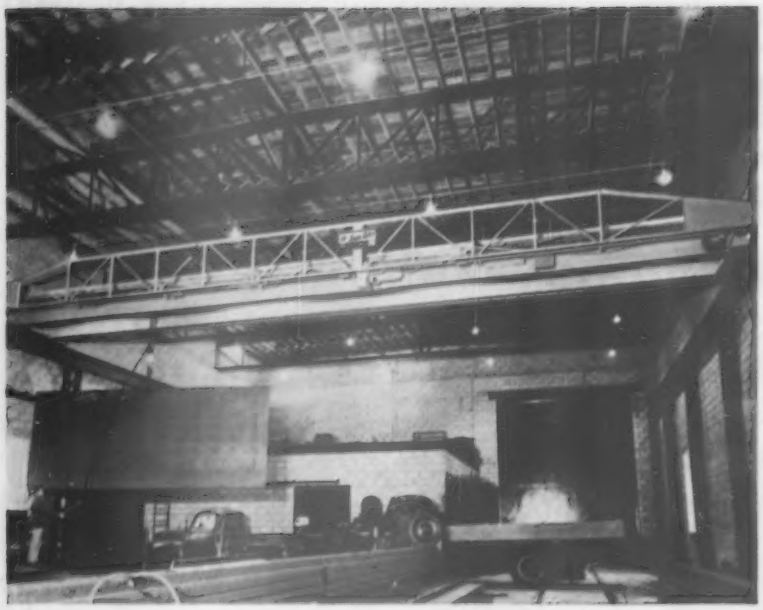


Modine special corrosion-resistant HCR Models available under plan

Modine offers a specially-built line of premium units for systems having severe internal corrosion problems. These models retain the light weight and top performance of standard Modines.

Modine
UNIT HEATERS

SU-1275



SAVINGS BEGIN WITH THE PRICE OF THIS CRANE

Series "D" 'Load Lifter' Cranes are highly standardized 1 to 20-ton cranes, mass-produced to sell for far less than other cranes for average industrial service. But the saving doesn't stop there. Year-after-year operational economy is accompanied by permanently reduced load-handling costs.

Series "D" All-Electric 'Load Lifter' Cranes provide dependable service because built into them are construction, operation and maintenance features you would expect only in the most expensive heavy-duty cranes. For example, strong, rigid *three-girder* design eliminates whipping and skewing. All gearing operates in oil in sealed housings. The motor and drive shaft are permanently aligned. Ball and roller bearings assure smooth, efficient operation. Spotting is simplified by fast-acting brakes and variable speed magnetic control, operated by push buttons on floor controlled cranes, and by master switches on cage controlled cranes. From end trucks to load hook, safety devices protect man, load and crane.

It's easy to buy a Series "D" 'Load Lifter' Crane for cage or floor operation. Just get a copy of Catalog 221, then select the size and type that best meets your requirements. Write today.

'Load Lifter' CRANES

MANNING, MAXWELL & MOORE, INC. Muskegon, Michigan
Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

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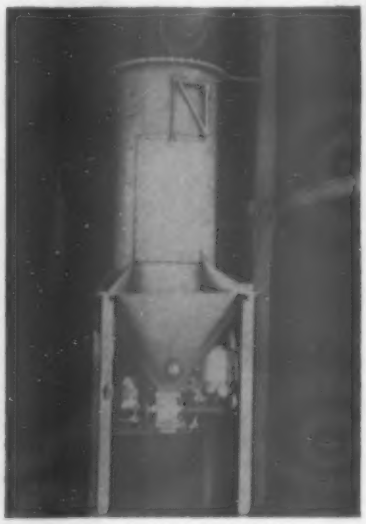
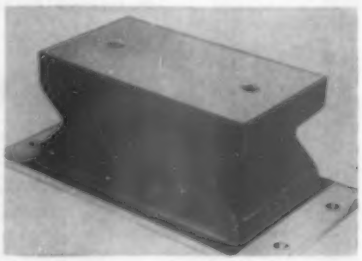
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.



49—Dust Collector and fractionator, power-driven, is comparable in efficiency to bag type, without expense of bags. In dry collecting, removes particles to 0.5 microns, 100% in many operations; wet, removes 100% to 0.1 micron. 300-30,000 cfm. *Majac, Inc.*



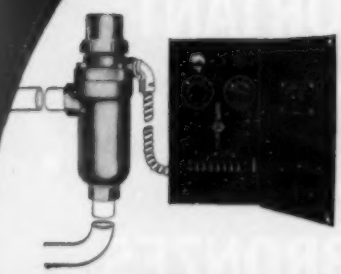
50—Mounting made with latticed rubber section bonded to steel plates isolates vibration and noise, especially in low-frequency, high-amplitude range. Where machine speed is low, install in series for better isolation. Capacities: 250-3000 lb. *Lord Mfg. Co.*

51—Densitometer eliminates smoke in stacks, ducts; monitors light transmission or optical density of liquids in processing lines; regulates turbidity in water and sewage treatments. Has light source, photoelectric scanner, control unit. *Electronics Corp. of America.*

Turn the page

keep liquid at its

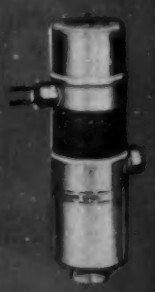
BEST LEVEL



...by remote control with

ALCO 908 LECTRO-LEVEL

CUTS OPERATING COSTS! It automatically maintains the level you choose. Just set the dial! It may be used to ring an alarm, control a pump or operate any electrical device. For all non-corrosive liquids with specific gravity of 0.5 or more. Write for bulletin 908.



...or with **ALCO J-5 Float Switch**

it holds liquid level to within a 5/8" differential ..."makes" the circuit when the level drops; "breaks" it when the level rises (reverse available). Only two major parts. For freon, methyl chloride, ammonia. Easy to install and service. Write for bulletins 175 and 175-1.

SEE YOUR ALCO WHOLESALER

Engineered—for Service for Life

ALCO

Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

ALCO VALVE CO.

833 KINGSLAND AVE. • ST. LOUIS 5, MO

6317

NOW it's 5 to 9!

Asarco now offers continuous-cast bronzes in 32 new sizes from 5 inches to 9 inches in diameter, supplementing established sizes up to 5 inches in diameter.

You can buy Asarcon Bronzes cored or solid *in the exact length you need.* You pay for no short-end scrap because there are none of the remnants you get from conventional 12-inch or 13-inch lengths.

Diameters of Asarco Continuous-Cast Bronzes now range from ½ inch to 9 inches in any size you need . . . many foundry alloys and a variety of shapes are available in all of these sizes. The famous "Asarcon 773" Bearing Bronze (SAE 660) can be shipped promptly from stock.

All bronzes produced by the patented Asarco continuous-cast process are metallurgically superior. There are no blowholes or porosity, no dross or dirt inclusions.

Write to us for more details, or get in touch with your nearby distributor of Asarco Continuous-Cast Bronzes.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

Perth Amboy Plant, Barber, New Jersey • Whiting, Indiana

WEST COAST SALES AGENT: Kingwell Bros. Ltd., 457 Minna Street, San Francisco

IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal

ASARCON DISTRIBUTORS

AKRON, OHIO—Akron Welding and Spring Co.
940 South High Street
ATLANTA, GA.—J. M. Tull Metal & Supply Co., Inc.
285 Marietta Street N.W.
BALTIMORE, MD.—Bronze Specialties, Inc.
1655 Warner Street
BEAUMONT, TEX.—Standard Brass & Mfg. Co.
705 Milam Street
BIRMINGHAM, ALA.—Dixie Bronze Company, Inc.
2231 - 27th Avenue, North
BOSTON, MASS.—Kelco Metal Products Co.
51 Sleeper Street
BRIDGEPORT, CONN. (See Stratford, Conn.)
BROOKLYN, N.Y.—Hamsley, Inc., 228—40th Street
BUFFALO, NEW YORK—Kencroft Associates, Inc.
373 Hertel Avenue
CANADA—Federated Metals Canada, Ltd.,
Toronto and Montreal
CARLSTADT, N. J.—E. A. Williams & Son
325 Washington Avenue
CHICAGO, ILLINOIS—Ray M. Ring Co., Inc.
4610-16 West Washington Boulevard
CINCINNATI, OHIO—Reliable Castings Corp.
3530 Spring Grove Avenue
CLEVELAND, OHIO—Copper & Brass Sales, Inc.
7711 Grand Avenue
COLUMBUS, OHIO—Williams and Co., Inc.
851 Williams Avenue
DAYTON, OHIO—The Bristol Brass Corp. of Ohio
1607 South Broadway
DETROIT, MICH.—Meier Brass & Aluminum Co.
1471 East Nine Mile Rd., Hazel Park, Mich.
EAST CHICAGO, IND.—Ray M. Ring Co., Inc.
3481 Michigan Avenue
EVANSVILLE, IND.—Orr Iron Company, Inc.
1100 Pennsylvania Street
GRAND RAPIDS, MICH.—Copper & Brass Sales, Inc.,
1855 Turner, N. W.
GUILFORD, CONN.—Knapp Foundry Co., Inc.
HOUSTON, TEX.—Standard Brass & Mfg. Co.
Franklin & Saint Emanuel Streets
INDIANAPOLIS, IND.—W. J. Holliday & Co., Inc.
545 West McCarty
JACKSONVILLE, FLA.—Florida Metals, Inc.
2937 Strickland Street
JERSEY CITY, N. J.—(See Carlstadt, N. J.)
KALAMAZOO, MICH.—Bard Steel & Mill Sup. Co.
251 North Edwards Street
KANSAS CITY, MO.—Hubbell Metals Inc.
801 Atlantic Avenue (North K.C.)
KENOSHA, WISC.—Badger Bearing Company,
660 Sheridan Road
LITTLE ROCK, ARK.—Arkansas Foundry Co.
1501 East 6th Street
LOUISVILLE, KY.—Williams & Co., Inc.
1109 South Preston Street
MEMPHIS, TENN.—Memphis Bearing & Supply Co.
477 South Front Street
MIAMI, FLA.—Florida Metals, Inc.
4206 N. W. 37th Court, Hialeah
MILWAUKEE, WIS.—Badger Bearing Company
1125 North Van Buren Street
MINNEAPOLIS, MINNESOTA—R. G. Eide
200 Washington Avenue N.
MUSKEGON, MICH.—Harbor Steel & Supply Corp.
543 W. Southern Avenue
NASHVILLE, TENN.—Industrial Bearing Service, Inc.
411 LaFayette Street
NEW HAVEN, CONN. (See Guilford, Conn.)
NEW ORLEANS, LA.—Standard Brass & Mfg. Co.
4701 Palmetto Street
NEW YORK, N.Y.—Metropolitan Area
(See Brooklyn, and Carlstadt, N. J.)
OMAHA, NEBR.—T. S. McShane Co., Inc.
1113 Howard Street
PEORIA, ILLINOIS—Ray M. Ring Bearing Co.
529 South Adams Street
PERTH AMBOY, N. J.—Gregg's Brass Foundry
259 Bertrand Avenue
PHILADELPHIA, PA.—Brass & Copper Sales, Inc.
310-312 Cherry Street
PHILADELPHIA, PA.—Renewal Service, Inc.
Northwest Corner 17th & Lehigh Avenue
PITTSBURGH, PA.—Pennsylvania Industrial Supplies Co., Inc., 1234 Ridge Avenue
PITTSBURGH, PA.—Pittsburgh Brass Mfg. Co.
3153-3155 Penn Avenue
PORT ARTHUR, TEX.—Standard Brass & Mfg. Co.
P. O. Box 1469
PROVIDENCE, R. I.—Clifford Metals Sales Co.
63 Eagle Street
ROCHESTER, N. Y.—Ontario Metal Supply, Inc.
91 Mount Hope Avenue
ROCKFORD, ILL.—Rockford Tool & Transmission Co.
802 Broadway
SHREVEPORT, LA.—Standard Brass & Mfg. Co.
2135 McClellan Avenue
ST. LOUIS, MISSOURI—Hubbell Metals Inc.
2817 Laclede Avenue
SOUTH BEND, IND.—Powell Tool Supply, Inc.
1618 Mishawaka Avenue
STRATFORD, CONN.—Ellsworth Steel & Supply Co.
1483 Stratford Avenue
SYRACUSE, N.Y.—Meloon Bronze Foundry, Inc.
1841 Lemoyne Avenue
TAMPA, FLA.—Florida Metals, Inc.
222 North 12th Street
TOLEDO, OHIO—Williams & Co., Inc.
946 Kane Street
TROY, N.Y.—The Troy Belting & Supply Co., Inc.
6 Grand Street
WEST COAST—Kingwell Bros., Ltd.
San Francisco and Los Angeles
with broad coverage in 11 western states

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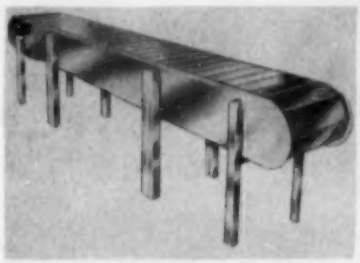
For more about these products, circle item numbers on Reader Service card next to back cover.



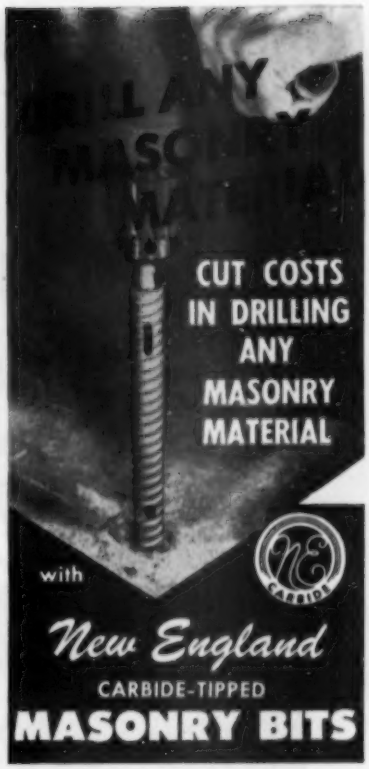
52 — All-Aluminum Conveyor is rustproof, non-corrosive, non-contaminating—ideal for sanitary handling. Easily, efficiently cleaned with hot water or steam. Pre-fabricated 5-ft. sections 6-96 in. wide; lengths to 175 ft. or more. Speed variable. *Mercury Industries, Inc.*

53—Plastic Tube Fittings made of a polyamide resin are for plastic tubing where corrosion is a problem. "Swagelok" fittings in elbows, tees, reducers, adapters, plugs, caps, bulkheads. To install, merely insert tubing in fitting, tighten nut. *Crawford Fitting Co.*

54—Heavy-Duty Relays, 10-amp., feature sectional pole design. Poles are individually removable and replaceable without disturbing other poles or wiring. Type PM relays made with 2-12 poles. Relays to 8 poles available without double-decking. *Clark Controller Co.*

55—Tractor, gasoline - powered, rider type, hauls loads to 15 tons despite small size. Simple coupling device facilitates hooking to all types of trucks and hauling equipment. Width of the "Handler" is 29 in., length 45 in. Turning radius is only 40 in. *Colson Corp.*

Turn the page



ROTARY TYPE	HAMMER TYPE
Cycle-twist and Cycle-Core	*Thunder-twist and Thunder-Core*

The ONLY Complete Line of Carbide-Tipped Masonry Bits in the world.

- Bits . . . to drill any kind of masonry, soft, medium, hard or abrasive.
- Bits . . . to drill any size of hole from ⅛" to 6".
- Bits . . . to drill any depth of hole up to 36"
- Bits . . . rotary electric drills or power hammer.
- Bits . . . that do the job easier, quicker and more economically.

Send for your FREE "What and How" Manual of Masonry Drilling. Shows you the right bit for any masonry.

NEW ENGLAND CARBIDE TOOL CO., INC.
60X Brookline St., Cambridge 39, Mass.

Please send me my FREE "What and How" Manual.

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____

Kinnear Steel Rolling Doors

(made by the originators of the famous interlocking steel-slat door)

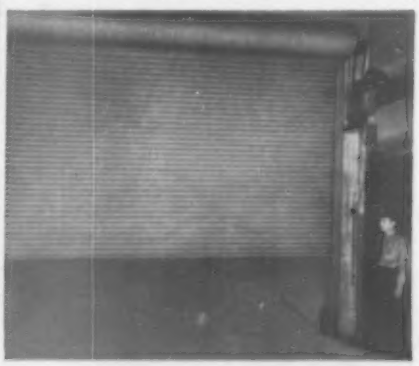
give you highest efficiency,

(they open straight up, coil overhead, waste no floor or wall space)

extra all-metal protection,

(their rugged steel construction resists fire, wind, theft, vandalism)

Heavy galvanizing adds 1.25 oz. of pure zinc per sq. ft. of metal by ASTM standards.



and lower operating costs

(delivering up to 20, 30, and 40 years of continuous daily service with little or no repair costs, as proved by many case records in Kinnear's files.

Kinnear Rolling Doors are built any size, for old or new buildings, with manual, chain, crank or motor operation. Write for complete information.)

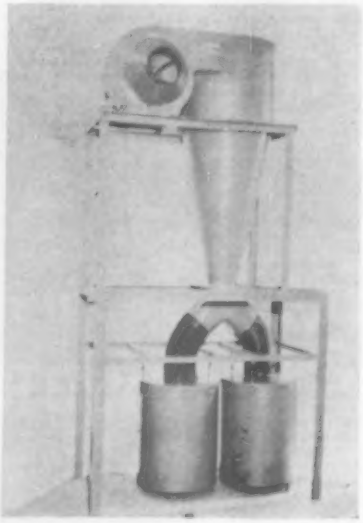
KINNEAR ROLLING DOORS — SAVING WAYS IN DOORWAYS

THE KINNEAR MFG. CO.

FACTORIES:

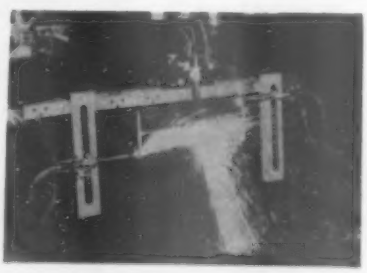
1540-60 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif
Offices and Agents in All Principal Cities

For more about these products, circle item numbers on Reader Service card next to back cover.



56—Dust Collector is especially useful where dust volume runs to high bulk. Air handling capacity is 3600 cfm.; static pressure, 6 in. of water. Two roller dust cans eliminate emptying by shovel. Recirculating air unit or outside exhaust. *Aget Mfg. Co.*

57—Totalizer converts weight readings of dial scale to digital equivalents. Remotely controlled; can be used with any dial scale. Useful for receiving, shipping, processing material through automatic hopper scale connected to dial scale. *Richardson Scale Co.*



58—Flame Saw cuts to 36-in. steel structurals, 16-in. thick plates—handles beam mitering, edge preparation, straight, circle cutting. Portable unit requires only 110-volt power supply, set-up of oxygen and fuel gas. Costs less than mechanical saws. *K-G Equipment Co.*

Turn the page

SPANG® CW STEEL PIPE GIVES

TOP-QUALITY SERVICE AT MERRY ACRES MOTEL

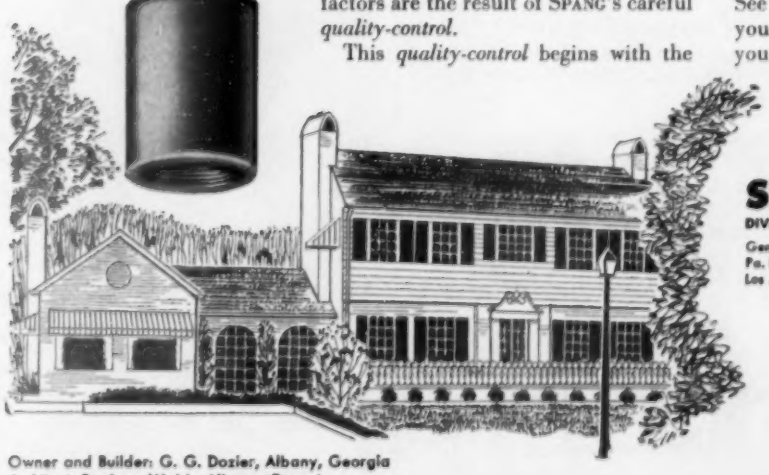
Merry Acres Motel, situated on ten acres of beautiful ground in a quiet suburban section of Albany, Georgia, is typical of the many new motels that line our highways, offering *top-quality* service to motorists. Each of the 33 rooms at Merry Acres was planned to give overnight guests maximum comfort and convenience.

To assure a *top-quality* plumbing installation in each room, 2,165 feet of SPANG CW Steel Pipe were installed. The specs called for SPANG CW, not only because it is easy to work with, but also because it has a *top-quality* reputation for giving years of dependable service. These two important factors are the result of SPANG's careful *quality-control.*

This *quality-control* begins with the selection of *top-grade* skelp, continues through the close control of the manufacturing process, and includes the final inspection and testing of the finished pipe.

Quality-controlled SPANG CW is easy to bend, cut, thread and weld. It has strong, uniform welds; smooth, clean inside finish; uniform diameter . . . all important features in lowering installation time and costs.

Why don't you take advantage of SPANG's *quality-control?* Whatever your piping needs may be—radiant heating, snow-melting, plumbing, air conditioning or water lines—SPANG CW Steel Pipe will give you *top-quality* service. See your local SPANG Distributor, for your next order of pipe. He will give you *top-quality* service, too.



SPANG-CHALFANT
DIVISION OF THE NATIONAL SUPPLY COMPANY
General Sales Office: Two Gateway Center, Pittsburgh, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

SPANG CW STEEL PIPE SPANG

Owner and Builder: G. G. Dozier, Albany, Georgia
Architect: Rayburn Webb, Albany, Georgia
Plumbing Contractor: Lipsey Heating and Plumbing Company, Albany, Georgia
Spang Distributor: Engineering and Equipment Company, Albany, Georgia

SHEPARD NILES

Monorail Hoist

FAST SERVICE

from point to point in your plant

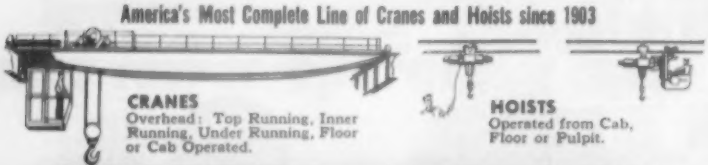
Materials Move Faster

. . . when they're sped through the air on a Shepard Niles Monorail Hoist! Because there are no obstacles in the way, like men or machines, to slow their travel down.

Shepard Niles offers you a complete line of hoists for constant or intermittent service. Available in light, medium and heavy duty equipped with either cab or floor controls. Choice of fast, medium or slow speeds.

Write for Monorail Hoist Bulletin . . . and ask to have a Shepard Niles representative stop by your office. He'll assist you in selecting the hoist that best suits your plant.

America's Most Complete Line of Cranes and Hoists since 1903



CRANES
Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated.

HOISTS
Operated from Cab, Floor or Pulpit.

SHEPARD NILES
CRANE AND HOIST CORPORATION

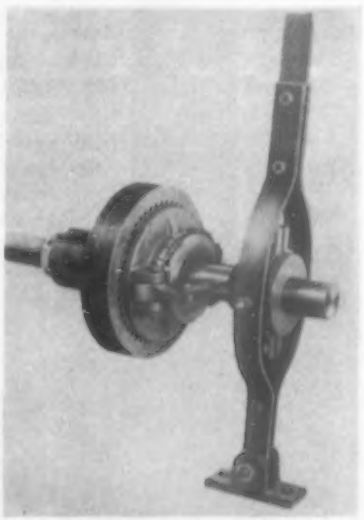
1154 SCHUYLER AVE., MONTOUR FALLS, N.Y.

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products circle item numbers on Reader Service card next to back cover.

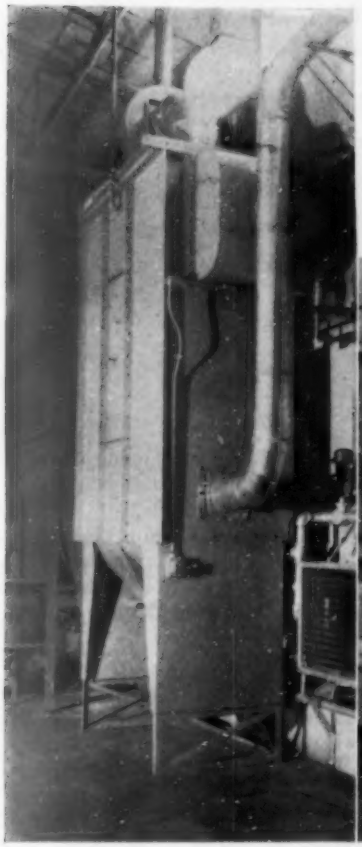
59—Hammer has interchangeable heads of aluminum, brass, copper, two types of nylon, three hardnesses of plastic. Heads snap in and out of body by means of spring pin which safely locks head. Aluminum or steel bodies, smooth or non-slip handles. *Hi-Lok Mfg. Co.*

60—Cable Vulcanizer makes quick on-the-job jacket repairs or replaces insulation and jacketing when splices are required. Aluminum molds cover most standard, many special cords and cables to 2-in. diameter. Operates on a-c or d-c to 1000 watts. *Joy Mfg. Co.*



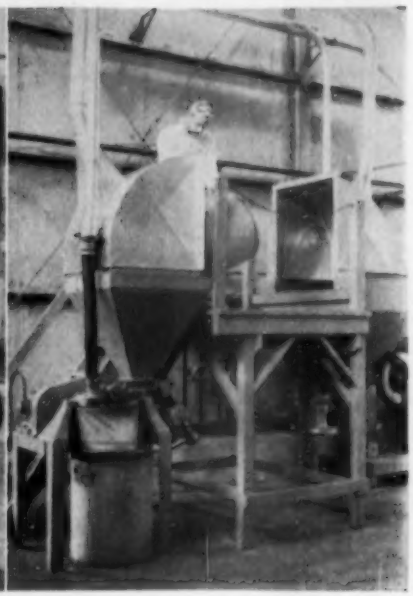
61—Friction Clutch is ideal where increased speeds prohibit jaw clutches; for smooth, gradual pickup. Positive positioning, minimum accidental engagements or disengagements, drag-free idling. To 170 hp. Mounting sleeve or ring, or as coupling. *Link-Belt Co.*

Turn the page



HOW NORWICH PHARMACAL CO.

STOPS PRODUCT LOSS



SALVAGES VALUABLE FURACIN WITH A WHEELABRATOR® DUSTUBE® COLLECTOR

Norwich Pharmacal Co. has added 2% to its gross output of furacin by installing a Wheelabrator Dustube Collector to ventilate two operations in its processing line.

Desiring to salvage as much of the product as possible, the company installed hoods over the milling and weighing stations and connected them to a highly-efficient Wheelabrator cloth tube type dust Collector. The Wheelabrator Dustube Collector filters the fine furacin powder from the air, removing more than 99% of this material. The high rate of recovery not only saves valuable material but it provides a more pleasant and comfortable place to work.

Norwich first learned of the efficiency of Wheelabrator Collectors in its aspirin tableting operations. Here a Wheelabrator Collector paid for itself by recovering 1% of the total material handled.

Besides direct financial gain, dust and fume removal pays off in better working conditions, and, in many instances, reduced wear and maintenance of machinery. Let the efficiency, simplicity and economy of Wheelabrator Dustube Collectors start paying off for you. Write today for additional information.

For more details, send now for your copy of Catalog 372.

WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

374 S. Byrkit Street, Mishawaka, Indiana

Trail Blazer of Industrial Progress

How one man with a TENNANT Floor Machine . . .

TENNANT "K" dry-shaves dirt from floor; cleans 16" path.

shaves grease-caked dirt from factory floors – in 1 operation

As you guide it down an aisle, this big powerful TENNANT Machine does a cleaning job you'll find hard to believe. It outperforms a crew of men.

It combines 3 operations, shaving off thick grease-caked dirt at the rate of 8 to 20 lbs. per minute!

1. Shaves off thick deposits from floor by high speed pulverizing action of scarifying cylinder. Cleans 16" path. Works *dry*—no need for water or detergents.

2. Smooths and levels surface by exclusive planing action; doesn't dig or gouge floor. Helps level humps. Leaves good clean surface for fast, safe trucking.

3. Picks up salvage as it goes. Hurls traffic-packed dirt and grime into hopper. Does entire cleaning job in 1 operation. Gas or electric models (to 7.3 hp); also 25 hp mobile-type units. *Write today for details.*

TENNANT
ESTABLISHED 1870

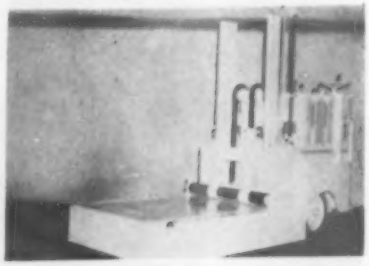
G. H. TENNANT CO.
2554 N. 2nd Street
Minneapolis 11, Minn.

FLOOR MACHINES
INDUSTRIAL MAINTENANCE EQUIPMENT

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

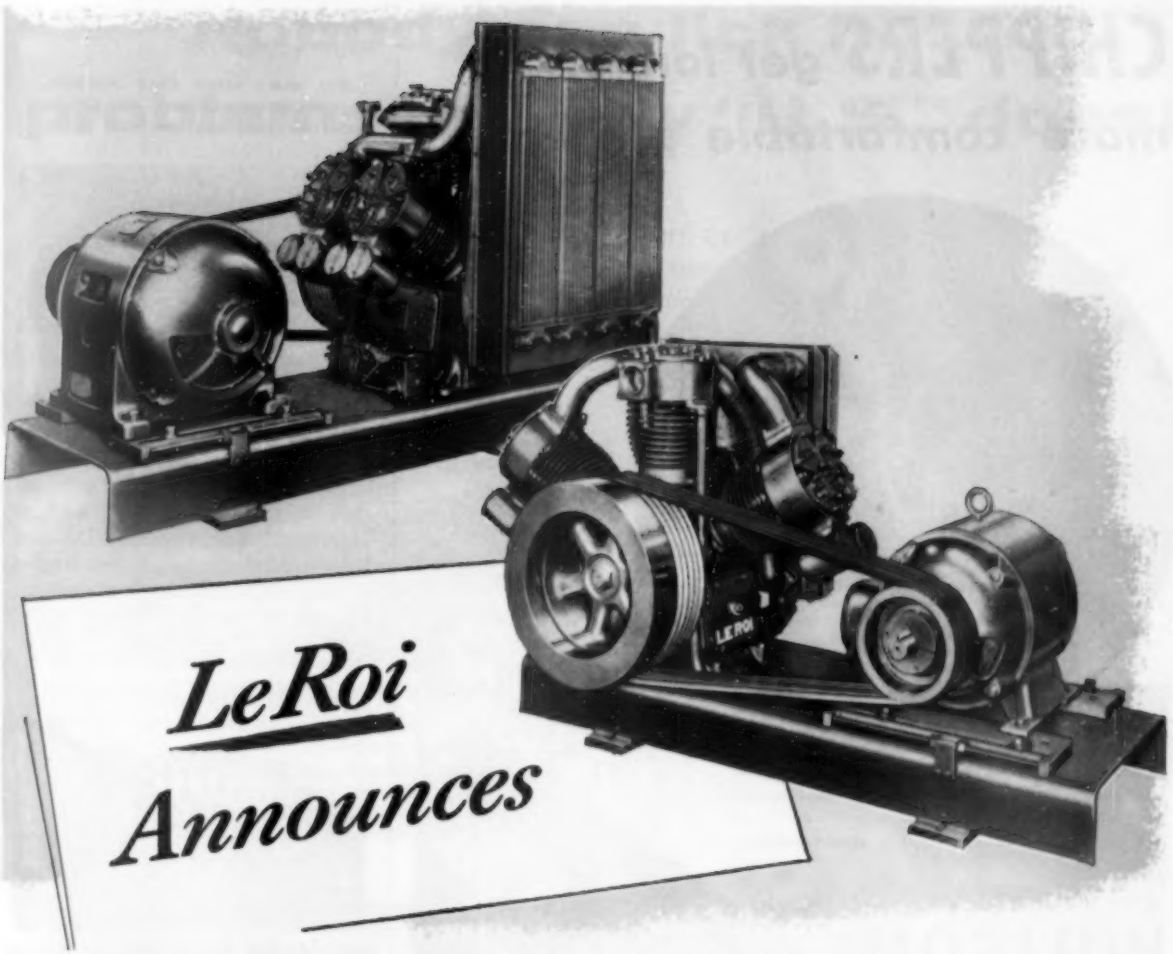


62—Die Handling Truck, hydraulically controlled, is a small-capacity unit: 16,000 lb. Length is 152 in., width 60 in., platform is 66-in. long, 60-in. wide. In low position, platform is only 17½ in. from floor; may be raised to 74 in. *Elwell-Parker Electric Co.*

63—Cleated Conveyor Belt for inclines has fabric-reinforced cleat with no joints, cracks, or gaps. Cleat and body are solid piece. Cleats in any height, width and spacing, stiff or flexible. Flexes around pulley diameters, compatible with weight. *A. J. Sparks Belting Co.*

64—Portable Dust Collector is ideal for small installations or isolated machines. Centrifugal separation minimizes load to standard "throw-away" filter. Heavier particles are deposited in drawer in base for quick disposal. 400-1000 cfm. *Schmieg Industries, Inc.*

Turn the page



Three New Stationary Compressors

Two-stage air-cooled units in 50, 75, and 100 hp. sizes having 200, 330, and 440 cfm capacities at 125 lbs. pressure

Now, Westinghouse Air Brake Co., through its Le Roi Division, adds three new compressors to its stationary line, giving you a size range from ½ to 100 hp. Built to give you years of service, these new compressors are designed to provide you with many important benefits—benefits that mean low-cost air for your plant, mine, quarry, ship, or construction job.

Low-cost operation — Good mechanical and compression efficiency resulting from 2-stage compression and intercooling keeps power costs to a minimum. Moreover, since these new Le Roi's are air-cooled, cooling-water cost is eliminated and attention on the part of the operator is greatly reduced.

Low-cost installation — Compact size reduces headroom and floor space requirements. Again, air cooling eliminates the need for water and water piping so that you can install these units practically anywhere with no fear of freezing. Minimum vibration and light weight lets you bolt them to a substantial floor and save on foundation costs.

Low-cost maintenance — All valves are interchangeable, both intake and discharge. Shrouded-type intercooler and large air passages promote longer valve life. No anti-freeze is required and there are no cylinder jackets or intercooler water passages to clog or scale. Forced-feed lubrication supplies oil under pressure to all moving parts and a sight-level oil gauge keeps the operator posted on the oil supply. The crankshaft is suspended on taper roller bearings that seldom need adjustment, and all parts are easily accessible.

Dual control is standard equipment and permits either constant-speed or automatic start-and-stop regulation. Here's a practical answer to low-cost air supply. Write for our latest literature.

SC-100

LE ROI Division of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Distributors in all principal cities

CHIPPERS get longer, more comfortable protection

Rigid metal top bar holds sturdy nylon cups firmly—makes goggles much easier to handle, too!

Kover-Mor® Goggles designed for chippers are fitted with Willson *Super-Tough* lenses heat treated for greater impact resistance. Note how 4 screened eye cup ports admit air to keep lenses fog-free.

WILLSON

Kover-Mor® Goggles are roomy

...fit over large-frame prescription glasses

Kover-Mor® Chipper's Goggles are made of lightweight nylon with the highest *strength/weight ratio* known for goggle cups. Chippers say they have features that make them the most comfortable goggles of all.

Snug, easy fit is assured by adjustable two-piece headband, leather bridge curtain and metal top bar. Extra ventilation is provided by slots in screw caps *plus* ports in cups.

Standard 50 mm. round lenses fit Kover-Mor® Goggles. No need to stock odd-size replacement lenses! Lens changing is simplified by external screw caps.

Ask your Willson distributor for Kover-Mor® Chipper's Goggles—available with opaque or clear nylon cups. They'll withstand toughest use.

More Than 300 Safety Products Carry This Famous Trademark

WILLSON

Leaders in Research and Development of Safety Products Since 1870

WILLSON PRODUCTS, INC., 218 WASHINGTON ST., READING, PA.

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

65—Cage Winding has "flexible finger" design to eliminate failure on large synchronous motors with severe starting requirements, such as centrifugal compressors. Damper bars expand freely against fingers of end rings, eliminating stresses. *Electric Machinery Mfg. Co.*

66—Stacker has adjustable boom mechanically raised and lowered by pushbutton controls. Operator merely guides items into place, swings boom right and left. Combined with "Flex-Bend Conveyor" makes one-man boxcar loader. *R. T. Sheehan Co.*

67—LP Gas Tractor, Model A-460 "Banty," offers all the advantages of LP: easier starting; smoother operation; no crankcase dilution, as no liquid washes down cylinder lubricant; less wear on cylinder walls and bearings. Designed for easy maintenance. *Mercury Mfg. Co.*

Turn the page

Nobody can lick hose problems the way "U.S." does!

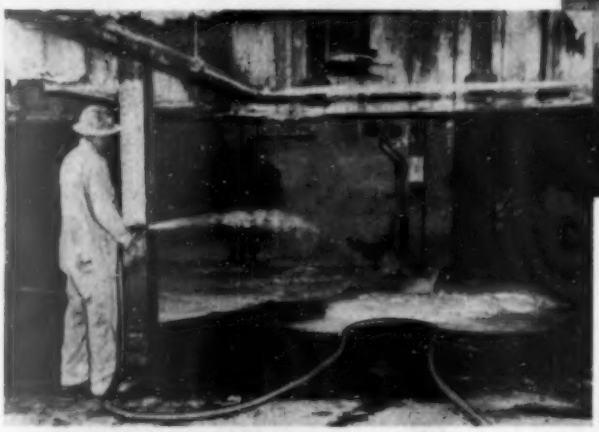
Every type of United States Rubber Hose – air, steam, water, fire, oil – is built to give you *quality* service under the most rugged working conditions. There is a "U.S." hose for every requirement, in the right sizes and lengths. When you choose a "U. S." hose, you can be certain your investment will bring you the greatest return in trouble-free performance, in operating life, and in economical service. Spotlighted here are three "U.S." hose from our stocks of the complete "U. S." line – *a line that delivers unmatched performance and quality.*

U. S. Royal Cord Air Hose—P-425

The only cord air hose built with true tire construction. Made in continuous lengths up to 500 feet, the U.S. Royal Cord Air Hose is especially recommended on long air lines such as on pavement breakers, rock crushers, in quarries, mines, for road paving, riveting hammers and many other industrial uses. Lightweight, highly flexible. So tough it needs no cribbing to protect it.

U. S. Matchless® Steam Hose—P-559

Each reinforcing wire consists of 13 steel strands braided in a unique construction providing outstanding strength *with* high flexibility. Not affected by heat. After long, safe service (even with steam pressures up to 200 pounds) the wall structure, instead of bursting, allows a trickle of steam to merely *leak* through – acting as a safety valve and giving notice that it's finally time for a replacement. That's why plant safety councils everywhere firmly approve of the U.S. Matchless.



U. S. Rainbow® Water Hose—P-340

Built of stoutly braided rayon plies, thoroughly impregnated with rubber. Both inner tube and smooth, black outer cover are seamless and are compounded of tough durable stock. Sizes ¾" up to 1½". Furnished in continuous lengths.

"U. S." Research perfects it . . .

"U. S." Production builds it . . .

U. S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

It Pays To Take a

Plant-Wide Look

at Weighing!

A Modern Weighing System Makes the Big Cost-Control Difference

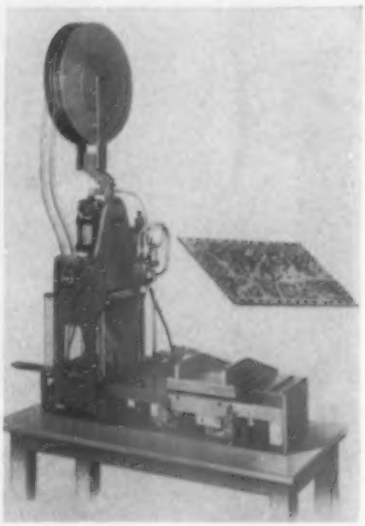
Today it's more than ever important to think of weighing not in terms of isolated scales, but as a vital part of your overall quality-control and cost-control system. This means the right scales in the right places . . . to provide basic accounting records of materials received, processed, shipped or transferred. Weight records that originate at scales directly affect costs, inventories and customer billings. Weighing errors cannot be corrected later—weights must be right the *first* time. That's why it's so important to have a modern weighing *system* for top efficiency in your plant operations.

May we tell you more about the "weighing system plan"—and its application to your requirements? Write to . . . Toledo Scale Company, Toledo 1, Ohio.

FACTORY / EQUIPMENT NEWS
Begins on page 158

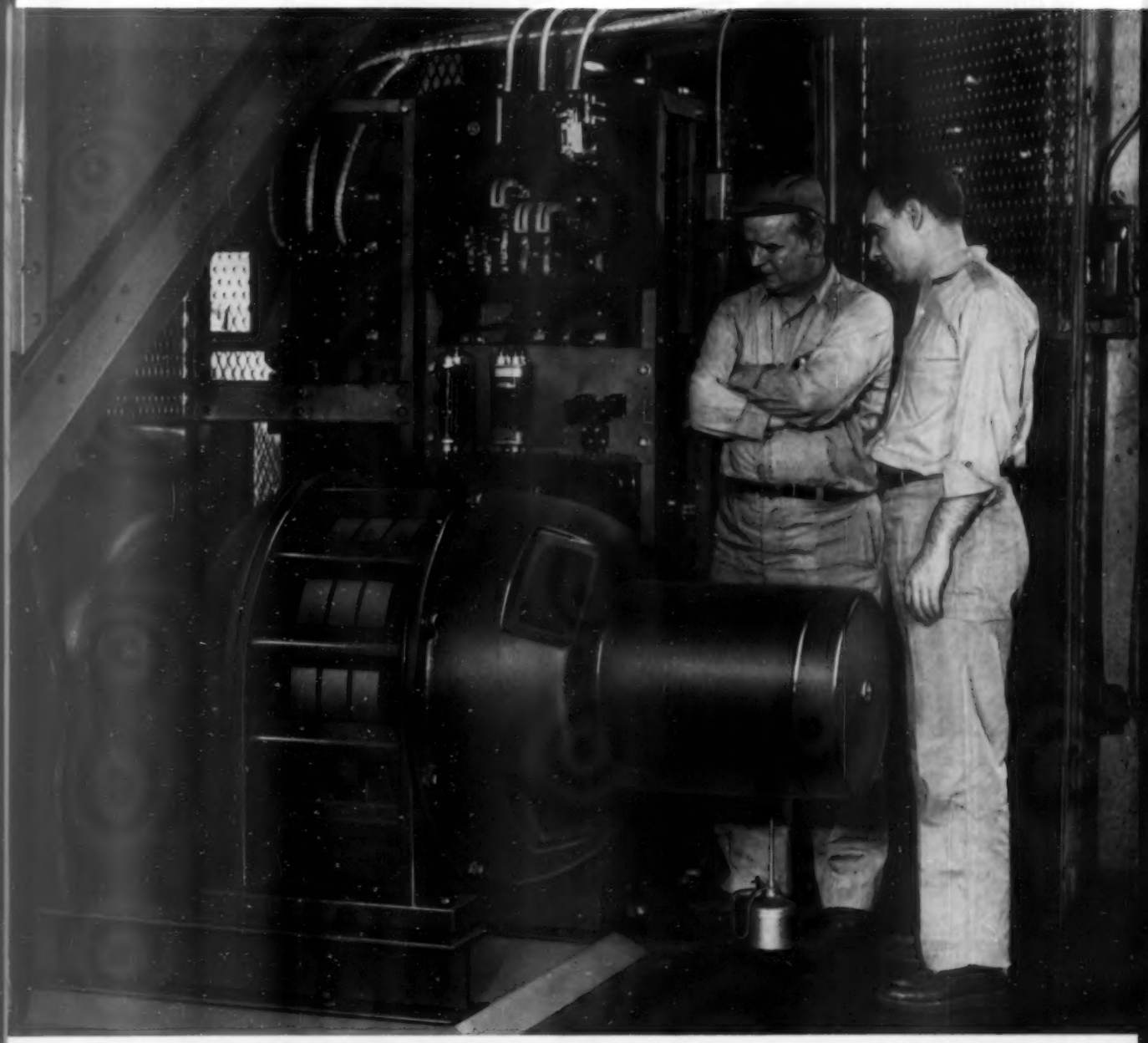
For more about these products, circle item numbers on Reader Service card next to back cover.

68—Wet-Dry Vacuum Cleaner has large, non-marking rubber wheels; handle bar for convenient carrying. "Vacmobile" climbs ramps and stairs without lifting. Master Tool with slide-on adapters meets every cleaning need. Recovers 12 gal. or 1½ bu. *West Disinfection Co.*



69—Automatic Inserting Machine is for printed circuits. Simultaneously inserts 40 or more self-retaining pin terminals or contacts into printed circuit board, in any symmetrical or non-symmetrical pattern, in 3-second cycle. Pins do not loosen. *Malco Tool & Mfg. Co.*

Turn the page



Problem:

How would you protect this key motor?

STOCK A COMPLETE MOTOR?	STOCK A COMPLETE ARMATURE?	STOCK ARMATURE COILS?	STOCK NO CRITICAL PARTS?
☐	☐	☐	☐

TURN PAGE AND SEE G.E.'S Productive Maintenance ANSWER ➤

GENERAL ELECTRIC

HERE IS A TYPICAL PARTS PROTECTION ANALYSIS

(This evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

X Add disassembly, assembly and transportation time to actual time.

* Add repair cost, on straight time basis, of failed unit.

THIS IS AN EXAMPLE—taken from an actual case history—of how you can carry out Step 4 in General Electric's *Productive* Maintenance plan. To begin with, assume the worst: an armature failure which would require lengthy downtime, at $700 per hour. The motor involved is a 500-hp slow speed d-c motor on a machine critical to production. When all figures are added, it is evident that stocking of a complete armature is the most economical protection for this specific motor. Your G-E representative can help you make the right decision about better protection for each of your critical drives.

THIS EXAMPLE SHOWS YOU HOW...

Productive Maintenance

The problem of keeping your key electrical equipment in operation isn't a simple one these days when the equipment and the production lines are becoming more and more complex. To solve the problem, you must bring to bear more maintenance know-how and specialized skills than ever before. More and more, the responsibility for increasing production—through more effective maintenance—rests on your shoulders.

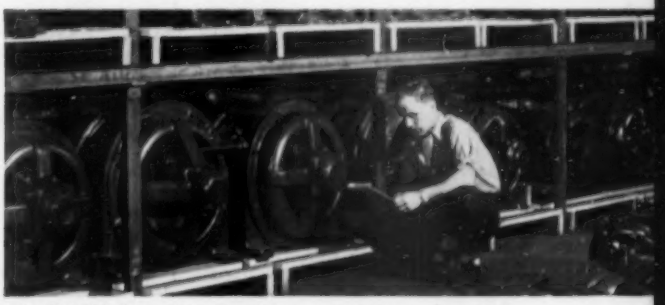
This *Productive Maintenance* 5-step plan can make your maintenance budget more effective . . .

1. Gather complete equipment data. A record system of this inventory is a basic part of your program.

2. Determine amount of routine maintenance necessary for your system. Your G-E representative will help.

3. Put your record system to work. Set up inspection cycles, work orders and systematized stocks.

4. Inspect and evaluate all equipment vital to production. This data will help you determine the parts protection needed for each key item of electrical equipment.



5. Establish a critical maintenance program by stocking parts on a planned basis and scheduling overhauls well ahead of the actual maintenance date.

CUTS TOTAL COST OF BREAKDOWNS

General Electric's five-step *Productive* Maintenance plan can help you meet this responsibility. This plan is essentially an application of men, materials, and tools. (See 5 steps at top of page) By organizing this idea into simple steps, you can get more effective maintenance, more production from each machine and a smoother work flow.

Your General Electric Service Shop or renewal parts representative can give you the complete *Productive* Maintenance story. Ask him to arrange a showing of the G-E sound-color film on *Productive* Maintenance and to give you specific help and suggestions in setting up your own program. Or, fill in the convenient coupon on the next page and ask for General Electric brochure, "5 Steps to *Productive* Maintenance."

GENERAL ELECTRIC

TURN PAGE FOR PRACTICAL HELP

Call in a G-E representative for help in starting your own *Productive Maintenance* program

TRAINED ASSISTANCE in planning overhaul schedules (step 5) is yours for the asking. Your G-E Service Shop representative is a specialist who will work with you in setting up each step in a *Productive* Maintenance program specifically designed for your own plant.

COMPLETE PARTS DATA is essential. G-E Renewal Parts specialists can help you tailor a renewal parts program for your plant, and also guide you in establishing your parts inventory system (steps 4 and 5). Take advantage of this expert help.

Plan your overhauls this way: Systematically remove from operation the equipment that needs overhauling most. Do this at the most favorable time from your production standpoint. These planned, short-term outages take far less time and expense than unplanned shutdowns. Your G-E Service Shop representative can help assess your equipment's condition, and utilize G-E Service Shop facilities to make your *Productive* Maintenance program fully effective.

When setting up your *Productive* Maintenance program, steps 4 and 5 are most important. It will pay you to ask G-E maintenance experts for guidance in organizing your renewal parts budget so every dollar gives the most protection possible. This will help your maintenance become productive faster. Most parts are carried by a nation-wide network of strategically located G-E warehouses, as well as distributors in your area.

Productive Maintenance — as vital as production itself!

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
APPARATUS SALES DIVISION, SECTION 801-16
SCHENECTADY 5, NEW YORK

- ☐ Please send me the detailed manual "5 Steps to *Productive* Maintenance" (GEA-6087).
- ☐ Please have a G-E representative call on me.
- ☐ I'd like to arrange a showing of the 25-minute sound-color movie, "*Productive* Maintenance."

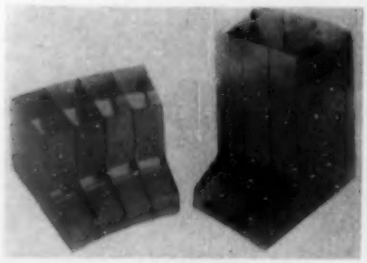
NAME_____ POSITION_____

COMPANY_____

CITY_____ STATE_____

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.



70—Assembly Bins have 3-in. lip designed for fast pick-up of parts; curvature within normal 19-in. sweep of arm for more output with less fatigue. Interchangeable sizes and types for any set-up. Fasten against wall for more table room. *Speedassembly Equipment Co.*

71—Resistance Welding Control features printed circuits and weld-safe circuit for protection of equipment and work in process. Combination of minimum circuit components and tubes and use of printed circuits reduces panel weight 30%. *Westinghouse Electric Corp.*

72—Strap Banding Machine automatically applies and tensions strap, makes and crimps own seals, and cuts strap—all controlled with one lever. "Autobinder" takes packages of different size and contour without adjustment; 7-in. wide to 22 x 20 in. *A. J. Gerrard & Co.*

Turn the page

USE ARCO RAYS MILL WHITES . . . OPTONIC® WALL COLORS

Good fog control is characteristic of the entire line of Arco Rays Mill Whites. Fast drying and minimum clean-up permit application without costly interruptions in factory routine. In particular Arco Rays with Fog Control Alkyd Flat, when applied at recommended pressure, produces practically no mist. Even at higher pressures, any spray dust dries while it's airborne . . . can be swept up as soon as it hits the floor.

The dense titanium pigmentation in these paints means one-coat coverage over the dingiest surfaces . . . even black . . . with minimum surface preparation.

With the advent of modern plant lighting, factory interiors no longer need be completely white. Arco can recommend, from its Optonic Color System, functional, harmonious colors scientifically selected to relieve eye strain and boost employee morale . . . colors that promote efficiency and good housekeeping.

Streamline your plant painting program and get the utmost for your maintenance dollar with Arco Rays Mill Whites and Optonic Wall Colors. For further information send the coupon below.

METAL PAINTS
HOUSE PAINTS
CALKING MATERIALS
MASONRY PAINTS
DUM DUM PRODUCTS
INDUSTRIAL ENAMELS

CODE NO. [illegible]

ARCO PAINTS
Quality... SINCE 1861

The Arco Company, 7301 Bessemer Avenue, Cleveland 27, Ohio
Gentlemen: Please send information on:
☐ Arco Rays Mill Whites ☐ Optonic Wall Colors
☐ Metal Paints ☐ House Paints ☐ Calking Materials
☐ Masonry Paints ☐ Dum Dum Products ☐ Industrial Enamels
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COMPANY _____
ADDRESS _____
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TESTED FIRST TO *LAST!*

Their problem? . . .

CORROSION

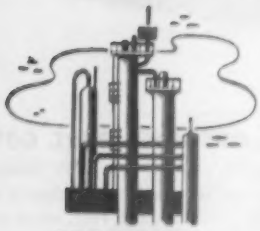
of industrial

equipment, materials

Their location? . . . anywhere in the nation . . .

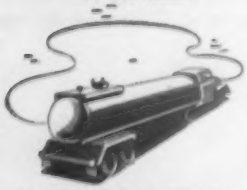
their dependable, economical answer . . .

ARco RUBBER PROTECTIVE LININGS and COATINGS



PROCESSING

STORAGE



TRANSPORTATION

● Whenever there's the slightest evidence of corrosion, there's the beginning of future losses . . . down-time, equipment and *customers.*

Even before this menace appears, ARco Engineers and ARco Anti-Corrosion Rubber Protective Coatings should be considered . . . for the long term savings they will deliver for a reasonable initial cost.

Regardless of your location . . . ARco Engineers will design, fabricate, insulate, and erect complete ventilation, storage, and processing installations . . . or, work with your equipment supplier in corrosion-proofing your systems.

Yes, due consideration to the problem of corrosion will produce the only logical answer . . . ARco engineering know-how and ARco Protective Coatings!

ARco FIELD SERVICE UNITS

ARco Field Service Engineers bring complete technical know-how and facilities right into your plant. Permanent installations or equipment too large to move can be fabricated and covered right on the job by our Field Service Units.

ARco

Write for complete information today!

MANUFACTURERS • DESIGNERS • ENGINEERS

Automotive Rubber Company, Inc.

12566 BEECH ROAD • DETROIT 39, MICHIGAN

●

ARco Rubber Processors

4033 HOMESTEAD ROAD • HOUSTON, TEXAS

FACTORY / EQUIPMENT NEWS

Begins on page 158

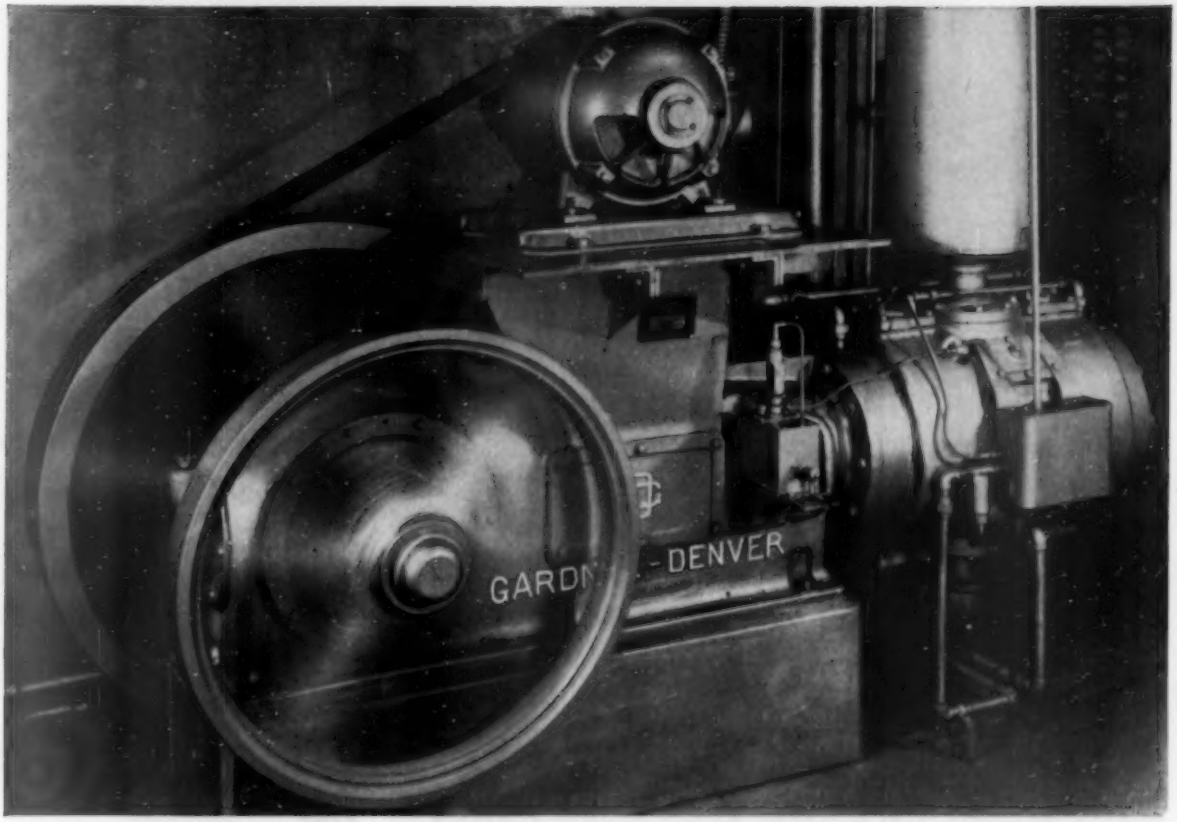
For more about these products, circle item numbers on Reader Service card next to back cover.

73—Shipping Box requires no nails or screws to close; opens easily without damaging contents. Cleats of "Panel-Lox Box" are so placed by prenailing, stapling, or gluing to panels that they interlock. Box can be knocked down and reused. *Cardinal Containers.*

74—Metal Remelter melts white metals and all alloys that melt below 1000 deg. F. Melts full pot from cold start in about 2 hrs.; additional loads in 1 hr. Capacity is 600- to 10,000 lb. Square or rectangular crucible and housing saves floor space. *Nolan Corp.*

75—Thermostats designed on building-block principle can be tailored to needs. Choice of 3 temperature ranges, 6 snap switches, 4 basic heads, 2 mountings. This 20,000 series is for temperature control and overheat detection of loads to 20 amp. *Fenwal Inc.*

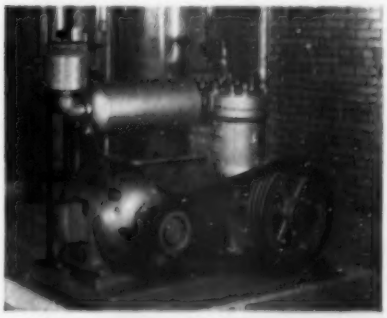
Turn the page



Model RX — 89 to 1292 c.f.m. Bulletin HAC-40.

MORE GARDNER-DENVER HELP FOR YOU IN THIS AGE OF AIR POWER

Model AA — 32 to 183.6 c.f.m. Bulletin AA-6.



* Expert help in choosing the right size and type air compressor for your plant.
* Pointers on compressor care and maintenance to help you obtain the full efficiency of Gardner-Denver quality.
* Application suggestions for utilizing low-cost air power from Gardner-Denver compressors.

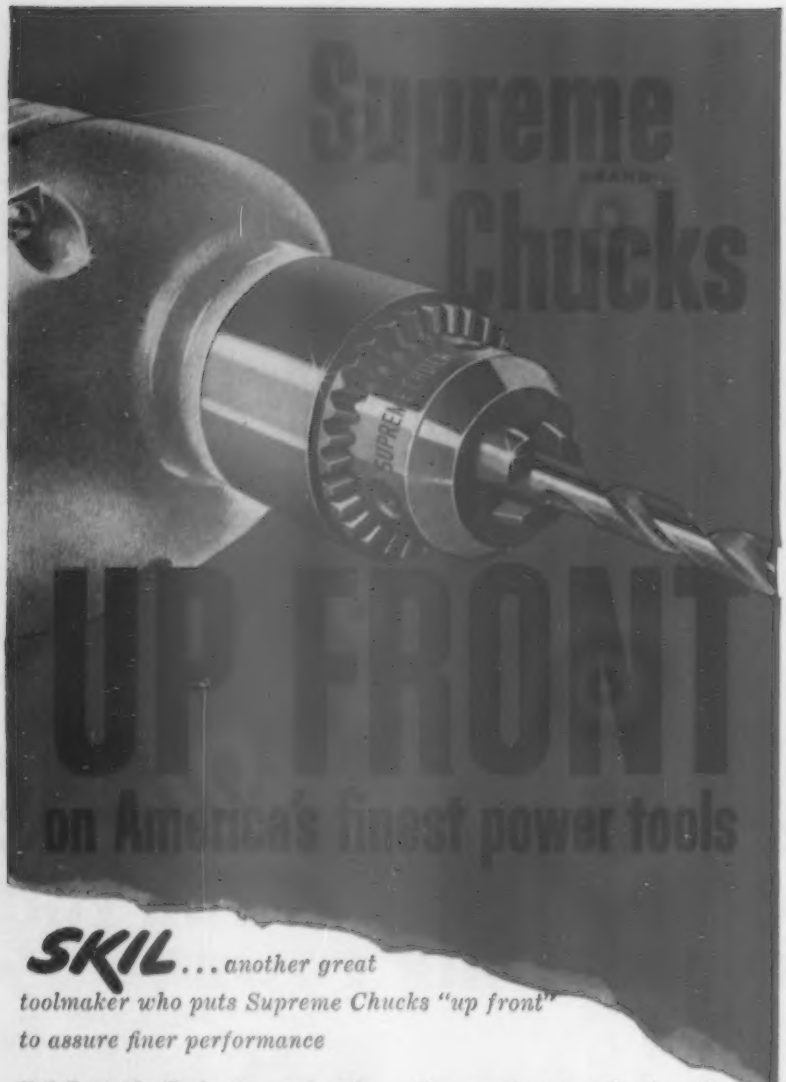
GARDNER-DENVER Since 1859 KELLER TOOLS

Model WB-142 to 686 c.f.m Bulletin WB-10.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 16, Ontario



SKIL... *another great toolmaker who puts Supreme Chucks "up front" to assure finer performance*

Skil Portable Tools are produced with the sincere intention of giving America's tool buyers the finest performance qualities possible. With this in mind, the management has elected to equip more and more of their output with Supreme Brand Chucks.

Skil, like other power tool makers, have found that they have a finer product to sell when there's a Supreme Chuck up front. Tool buyers everywhere will do well to follow the leaders and specify Supreme on new tools—insist on them for all replacement use.

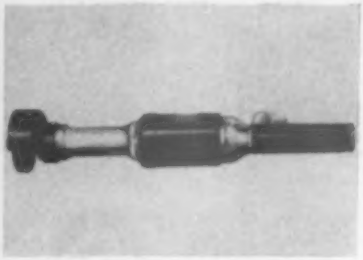
An industrial distributor near you can give you the full story on extra quality Supreme Brand Chucks.

SUPREME PRODUCTS, INC. • 2222 S. CALUMET AVE., CHICAGO 16, ILL.

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

76—Tape Dispenser accommodates 500-ft. rolls of water-soluble gummed tape ½- to 1½-in. wide. Delivers 2½- to 8-in. pre-set lengths with single stroke; longer lengths on repeated strokes. Tape automatically cuts on release of push-down lever. *Derby Sealers, Inc.*



77—Horizontal Grinder handles accurate grinding, using tool post holder; and heavier work, using 4- or 6-in. organic wheels. Features built-in muffler. Five speeds, ⅜-in./24 or ½-in./13 spindle. Adaptable for wire brushes or abrasive rolls. *Buckeye Tools Corp.*

78—Rack substitutes vertical T-assembly for usual horizontal stringer, allowing truck to enter bay to load or unload material in bay behind. Access to row through another row and repeat of this design on opposite side permits four rows without aisles. *Artco Corp.*

Turn the page

THE WESTINGHOUSE "MOTOR CONTROLS DE-MYSTIFIED!" TRAINING COURSE

Seven practical lessons on how to apply motor control

The Westinghouse "Motor Controls De-Mystified!" training course—the most comprehensive ever developed by Westinghouse—is now available to industry for the nominal cost of $85.00.

Seven lessons cover every phase of motor control and its application. They're ideal for group meetings. They're presented in a precise, clear, informative style capable of maintaining high interest.

For more details call your Westinghouse sales engineer or—order your "Motor Controls De-Mystified!" course direct from Westinghouse Electric Corporation, Film Division, P. O. Box 868, Pittsburgh 30, Pa. J-21914

HERE'S WHAT YOU GET

A. Instructor's manual.
B. 20 sets of seven lesson books.
C. 16mm sound motion picture—*Building Blocks*—on basic motor control components with 35mm follow-up film slides.
D. Seven 35mm sound slide films in color to accompany lessons.
E. Attractive case to protect it—carry it.

ALL FOR ONLY $85.00

YOU CAN BE SURE...IF IT'S Westinghouse

7 lessons—

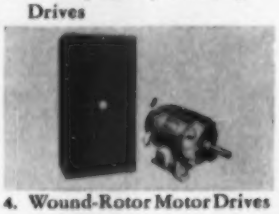
how to apply

motor control to—

1. Any Electric Motor Drive

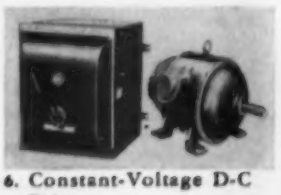
2. Single-Speed Squirrel-Cage Drives

3. Multispeed Squirrel-Cage Drives



4. Wound-Rotor Motor Drives

5. Synchronous Motor Drives



6. Constant-Voltage D-C Drives

7. Adjustable-Voltage D-C Drives

Herbrand can supply carbon steel wrenches in all popular sizes from 5/16" to 3½" openings, and can manufacture special wrenches to your exact specifications. Herbrand carbon steel wrenches are ideal for maintenance and production work, and to accompany finished products.

Herbrand industrial wrenches are drop forged from high carbon steel, and heat treated and tempered their entire length to assure utmost strength, endurance, and dependability. Surfaces and edges are ground smooth for accurate fit and easy handling. Finish is rust-resistant baked black enamel. Heads are ground bright. Get all the facts from your industrial distributor or write us for Catalog No. 10.

Herbrand produces forgings in any size or shape up to 200 lbs.

Quality Tools since 1881

THE BINGHAM-HERBRAND CORPORATION
Fremont, Ohio

Other Herbrand products include a complete line of Van-Chrome Tools..Ball Pein Hammers..Snips..Impact Sockets..¾" Drive Sockets..Complete Tool Sets

FACTORY / EQUIPMENT NEWS
Begins on page 158

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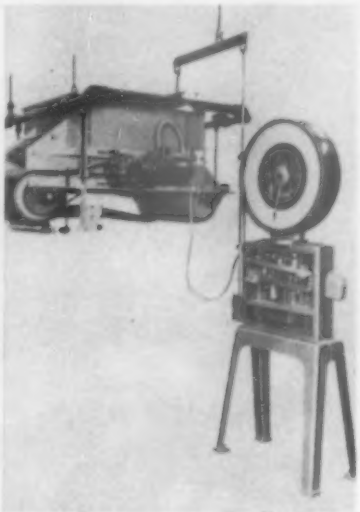
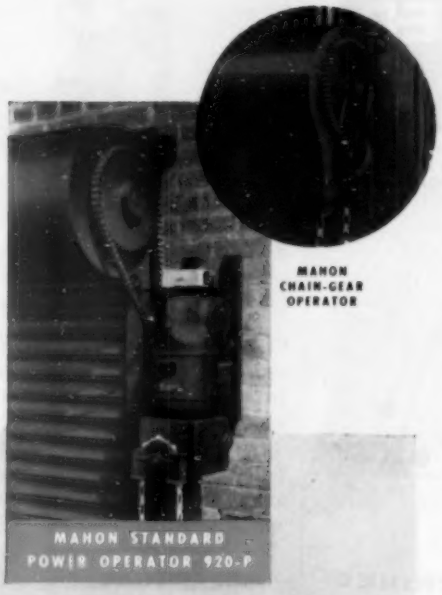


79—Scale for Adhesives — sticky and non-freeflowing materials—weighs them as accurately as dry aggregate materials. Automatically and continuously delivers selected amount of material. Weight is difference between fully and partially loaded scale. *Richardson Scale Co.*

80—Hydraulic Crane is for high-lift, close-quarter erection; heavy bucket work; big-lift, indoor jobs; precision handling. Standard boom extends to 36 ft.; optional lift to 50 ft. Model H-5 capacity is 9 tons; excavates ½ cu. yd. Mounts on truck. *Bucyrus-Erie Co.* *Turn the page*

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



MAHON CHAIN-GEAR OPERATOR

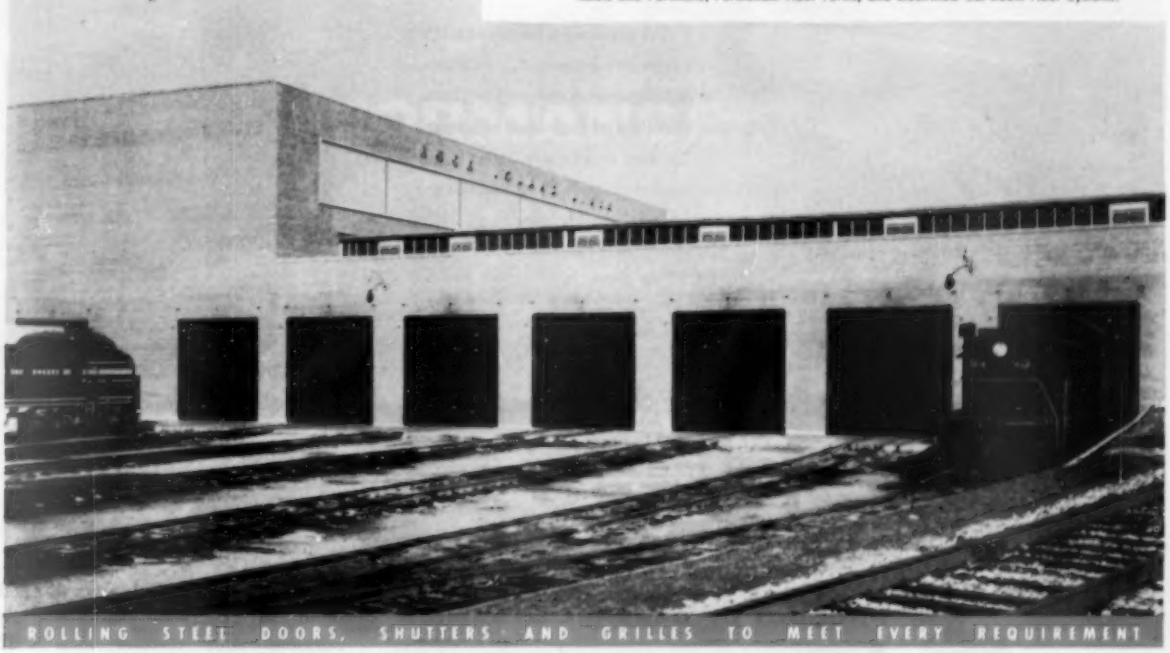
MAHON STANDARD POWER OPERATOR 920-P

For maximum protection, permanence, long life, and convenient, timesaving operation, most people, today, choose a good, power-operated rolling steel door. No other type of door can match their compactness in operation . . . the vertical roll-up action of the door curtain occupies no usable space either inside or outside the opening—and, there are no overhead tracks or other obstructions to interfere with material stacking or crane handling adjacent to door openings. A quick-opening, quick-closing Mahon power-operated Rolling Steel Door will save valuable time and valuable space in any type of opening. In addition, Mahon Rolling Steel Doors are permanent—their all-metal construction assures a lifetime of trouble-free service, and provides maximum protection against intrusion or fire . . . they require less maintenance, too, because, when the door is open, the interlocking steel curtain is rolled up above the opening safe from damage. When you select a Rolling Steel Door, check specifications carefully . . . you will find extra-value features in Mahon doors—for instance, the galvanized steel strip, from which the interlocking curtain slats are rolled, is Bonderized and dip-coated with synthetic enamel which is baked on at 350° F. prior to roll-forming. You will find other important Mahon features in both design and materials that add up to a greater over-all value. See Sweet's Files for complete information, or write for Mahon Catalog G-56.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales Engineering Offices in New York and Chicago • Representatives in Principal Cities

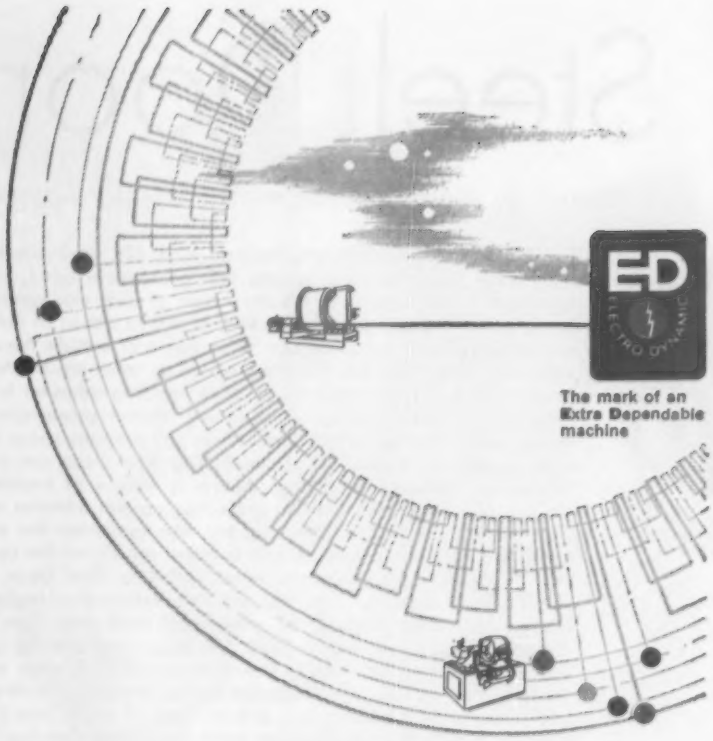
Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs and Partitions; Permanent Floor Forms, and Electrified Cel-Beam Floor Systems.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Eight Mahon Power Operated Rolling Steel Doors installed in track openings of a Diesel locomotive service shop. In addition to these, five Mahon Automatic Underwriters' Labeled Rolling Steel Fire Doors are installed in openings of interior walls. Rock Island Lines, Archts. and Engrs., S. N. Nielsen Co., Gen. Contrs.

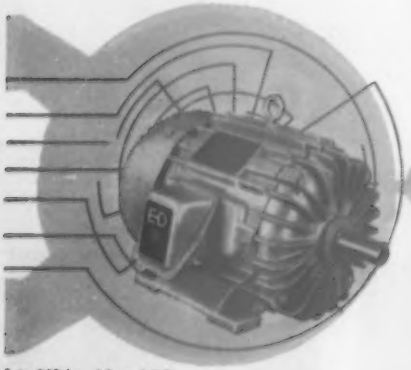
MAHON



The mark of an Extra Dependable machine

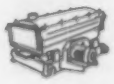
a better kind of power

FOR INDUSTRIAL MACHINES



1 to 250 hp. AC and DC. N.E.M.A. standards.

Extra starting and anti-stalling capacity: Extra cool, extra quiet operation: Achieved without sacrifice of full-load efficiency. Backed by unparalleled experience, E.D. motors are *extra dependable*—75 years in the making—yours today *at no extra cost!*



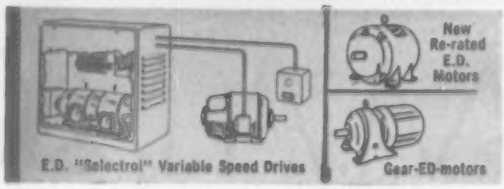
ELECTRO Extra DYNAMIC Dependable motors

PRODUCT OF GENERAL DYNAMICS

NEW...

Write for Brochure 100 and literature on new E.D. motors and drives.

Electro Dynamic division of General Dynamics Corporation Bayonne, New Jersey



FACTORY / EQUIPMENT NEWS
Begins on page 158

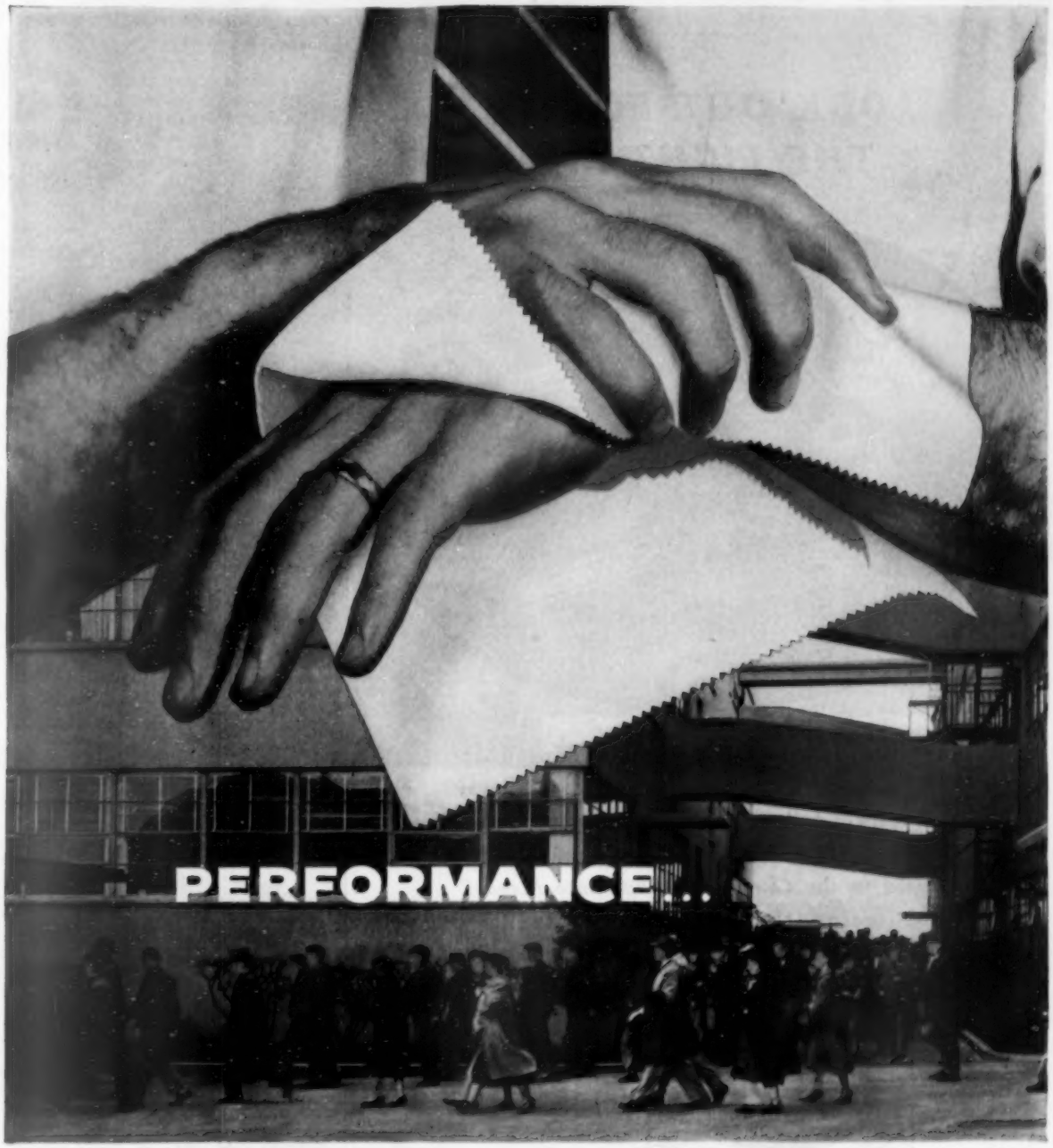
For more about these products, circle item numbers on Reader Service card next to back cover

81—Furnace Cleaner has disposable soot bag of white fiber. Just disconnect when filled, seal opening with sticker; discard bag. No fingers or clothes contact soot. Bags easily replaced; hold 12 lb. of soot. Portable vacuum weighs 20 lb. *Thompson & Sons, Inc.*

82—Heat Exchanger cools by evaporation, obtains temperature control (within 2 deg. F.) by modulating use of outdoor air. Casing shipped as flat panels, to be assembled on site, saving freight. Four sizes: 7-million to 18-million Btu./hr. *Niagara Blower Co.*

83—Plastic Lid Marker prints clearly in two colors on printable polyethylene and styrene lids, caps, covers, etc. Model 25AD2 machine speeds to 45 imprints per min.; takes various work holders, has 12-station dial feed. Adjusts to height, thickness. *Markem Machine Co.*

Turn the page



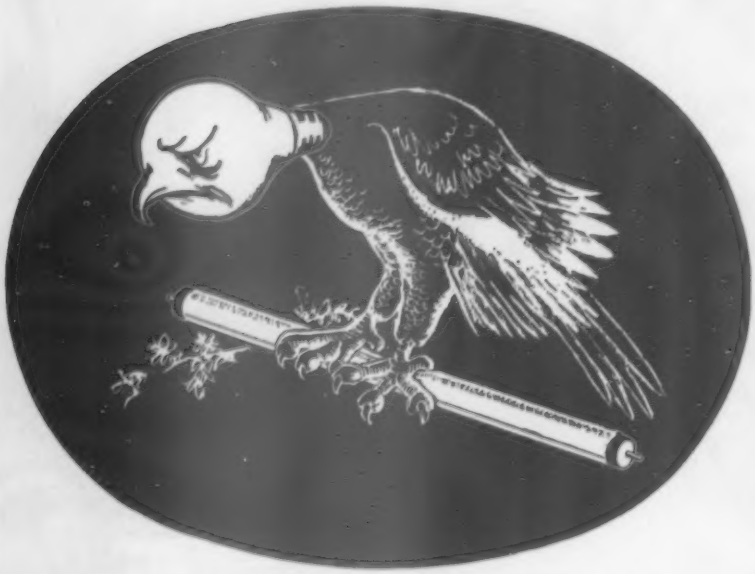
First with America's great industrial plants

NIBROC® TOWELS... first wet strength towel

and still the finest... Super-absorbent—strong—sanitary—soft-textured Nibroc Towels are used by more industries and business houses—institutions too—than any other paper towel. If you want top performance, buy Nibroc Towels and Nibroc Sofwite and Softan Toilet Tissue together—and save money. For name of distributor see "Nibroc" in your classified directory, or write Brown Company, Dept. NC-10, 150 Causeway Street, Boston 14, Mass.

His Royal Nibs

LOOK OUT FOR THE LIGHT-HAWK



The keen-eyed *Light-hawk* swoops down wherever lighting maintenance lags and flies away with power dollars. You can stop him by following the principles of good lighting practice presented in the *Champion Maintenance Manual** and seeing that the dependable name CHAMPION is on the lamps you use.

CHAMPION Lamps

**Write today for a complimentary copy.*

CHAMPION LAMP WORKS

308 Lynnway, Massachusetts

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

84—Heavy-Duty Switch operates with only 2½ oz. of force. For counting devices; applications requiring heavy-duty switch, light operating force. Wired, replaced without removing enclosure from mounting. Single-pole, double throw; two-circuit break. *Micro Switch.*

85—Chuck Attachment instantly converts almost any electric drill to an impact wrench. "StutterChuck" tightens bolts and nuts, wood screws, lag screws, etc., by rotary impact. Socket drive sizes ½- to ⅜-in. sq.; input shaft 5/16- to ¼-in. *Hewitt & Co.*

86—LP-Gas Sweeper will be welcomed by food processers, pharmaceutical plants; wherever gas fumes are undesirable. Models 605 and 606 have sweeping paths of 24-68 in.; capacities to 110,000 sq. ft. an hr. Dust goes to main hopper; no bags to empty. *Wayne Mfg. Co.*

Turn the page

Diagram shows location of electric cartridge heaters in relation to die contours.

precise electric heat . . .
improves die-forming of airplane propellers

In the manufacturing of hollow steel propeller blades, by this company, a ribbed thrust face and a matching camber sheet are furnace-brazed together. Before brazing, however, the camber sheet must be die-formed to exactly fit the thrust side of the blade.

It was found that a *heated* die-forming press produced better shaped camber sheets and relieved mechanical stresses. But the temperature had to be closely controlled at a minimum of 900°F in both top and bottom halves of the die. Only electric heat could meet these difficult conditions.

So sixty-three Chromalox Electric Cartridge Heaters, of selected lengths and wattages – totaling 97,350 watts — were inserted at regular intervals in the sides of the die, as shown in the diagram. Each half of the die was divided into six heat zones . . . with a thermocouple in each zone connected to a common control panel. Heat is generated in the right amounts *within the die.*

Results are uniform, controlled heat. Relatively low initial installation cost. Cool working conditions around the press. Consistent production. And six similar sets of dies, heated by Chromalox Electric Cartridge Heaters, now in operation in this plant.

This problem-solution-result approach has enabled us to help many manufacturers produce better, faster, at lower cost.

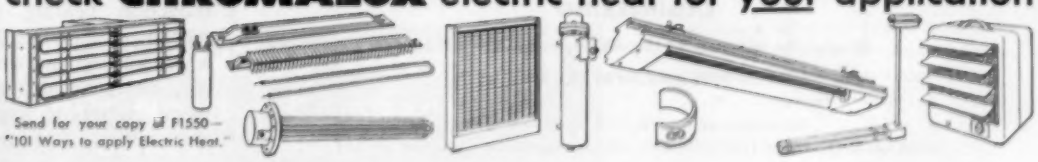
Always available to you are our research, engineering, design, and modern manufacturing facilities. The world's largest factory stock of industrial electric heaters plus local stocks at strategic points. And a 33-city nationwide sales-engineering service.

Let us know your problem for controlled heat and we'll go all out to help you find the right answer — electrically.

A-4426

EDWIN L. WIEGAND COMPANY
7518 Thomas Boulevard, Pittsburgh 8, Pa.

check **CHROMALOX** electric heat for your application



Send for your copy of F1550— "101 Ways to apply Electric Heat."

SEE *exhibits like this . . . at the*

CHICAGO EXPOSITION OF POWER & MECHANICAL ENGINEERING

WHERE? . . . Only minutes away from the ASME Meetings at Chicago's COLISEUM . . . one floor with information-packed exhibits—a minimum of walking to get a maximum of facts, helpful tips—a complete picture of Power and Mechanical Engineering TODAY!

WHEN? . . . November 14-18, 1955

WHY? . . . This special show is in conjunction with the 75TH ANNIVERSARY MEETING OF THE ASME. The significant theme of these sessions is "THE ENGINEER AND THE WORLD OF COMMERCE AND INDUSTRY." Subjects of vital importance to *your* field of interest will be covered. At the EXPOSITION, you'll *see* the newest, most advanced power equipment . . . manufacturers' exhibits that will show hundreds of new techniques to improve productivity and economy, and to utilize all types of power more effectively.

Plan now to attend the

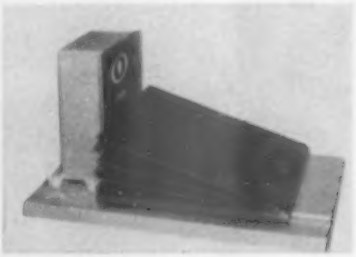
CHICAGO EXPOSITION OF POWER & MECHANICAL ENGINEERING

(Under the auspices of the ASME, and in conjunction with its 75th ANNIVERSARY Meeting)

For advance registration, write The Management:
INTERNATIONAL EXPOSITION COMPANY, 480 Lexington Avenue, New York 17, N. Y.

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.



87—Magnetic Sheet Floater eliminates fumbling with thin, oily sheets; minimizes possibility of feeding doubles, thus protecting dies; prevents scratching of painted or finished surfaces. Stainless steel enclosure protects from demagnetizing. *Dings Magnetic Separator Co.*

88—Rotary Spray-Painting Machine handles round and deep-draw parts with intricate design (diameters to 15 in.) that are difficult to hand-spray. Simple installation and operation. Air exhausted through rear; cannot contaminate working parts. *Conforming Matrix Corp.*

89—Wire Stripping Technique eliminates hand retwisting and retinning. Induction heating generator has special measuring devices, senses where cutting and stripping will occur, melts tin on strands, solders them. Adapts to any stripping machine. *Reeve Electronics, Inc.*

Turn the page

Coffing adds

NEW CABLE *Quik-Lift*

to its broad line of portable hoists

Now the Coffing Hoist Company, originator of the ratchet lever hoist and the first portable electric hoist, adds still further to its broad line with the new Cable Quik-Lift Electric Hoist.

Like the Coffing Coil Chain Quik-Lift this fast, flexible unit has all the rugged construction and operating features for tough production-line work.

Convenient to Use — Requires little head room. Hook block swivels to maneuver load without twisting cable. Handy push-button control — for spotting loads quickly and accurately.

Dual Brakes — *Load Brake* is Weston type with non-reversing clutch running in oil. Large area keeps heating within safe limits. *Motor Brake* is of shoe type with large surface area for instant stops without drift.

Built for Hard Service — Gears are heat-treated to get the right combination of hard-wearing surface and shock-resistant cores. Entire gear train is sealed and running in oil. Motor is completely enclosed, all metal parts are treated to resist corrosion.

Right Model to Fit Your Needs — Coffing Cable Quik-Lift Electric Hoists are available in six models with capacities from 500 to 4,000 lb. Choice of lug, hook, or trolley suspension.

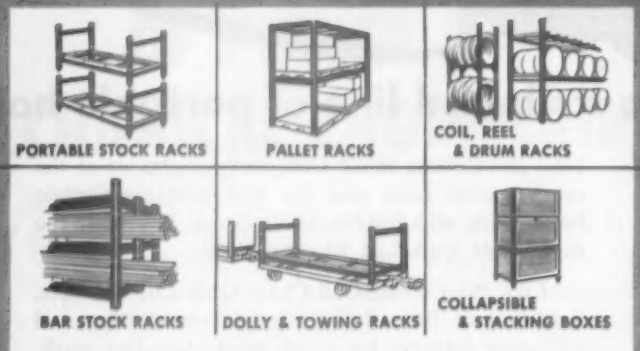
Coffing Hoist Division
Duff-Norton Company
Danville, Illinois

Hoist-Alls • Safety-Pull Ratchet Lever Hoists
Mighty-Midget Pullers • Spur-Gear Hoists
Differential Chain Hoists • Load Binders
I-Beam Trolleys

You Can stack ANYTHING on **E.M.I.** Racks

cut time and handling costs
keep your materials
well stacked!

Equipment Manufacturing storage racks that stack are fabricated of strong, square tubular steel and are adjustable to fit any space or unit load in your plant or warehouse. Special racks designed to your specifications. Field Engineering Service on any installation. Before you decide on a new warehouse, additional storage space or the purchase of stacking equipment, write for our catalog. You save money, space and time with E. M. I. racks.



E.M.I. Pallet Racks are installed at the efficient American Locomotive Company Warehouse in St. Louis, Missouri.

Write for Illustrated Catalog

EQUIPMENT MFG. INC.

21560 HOOVER ROAD • DETROIT 5, MICHIGAN

Materials Handling Equipment — Stacking Racks for Industry

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

90—Portable Dewpoint Indicator, manually operated, is ideal where periodic checks only are needed. Determines moisture content of gas by measuring temperature at which moisture begins to condense. Useful for furnace atmospheres in heat treating. *General Electric Co.*

91—Fractional Hp. Motors, single-phase, with ball bearings and dual-voltage windings are about same price as sleeve-bearing single-voltage motors. ¼, ½, ¾ hp.; 1200, 1800, 3600 rpm.; for 115- or 230-volt, 60-cycle power supplies. *ACEC Electric Corp.*

92—Motor-Driven Flashers, utilize mercury-to-mercury contacts for high current interrupting capacities. Plug-in units obtain any rate interrupting or coded flashing cycles for all-purposes or Class 1, Div. 2 use. 6-250 volts, a-c or d-c. *Industrial Automation Corp.*

Turn the page

Duriron Acid Resisting Drain Pipe

DURIRON® generally outlasts the building

Specify DURIRON for *permanent* drain lines to handle acids and other severe corrosives. DURIRON is a high silicon iron that is corrosion resistant throughout. It is not a coating. DURIRON is resistant to practically all commercial acids and many other corrosive solutions.

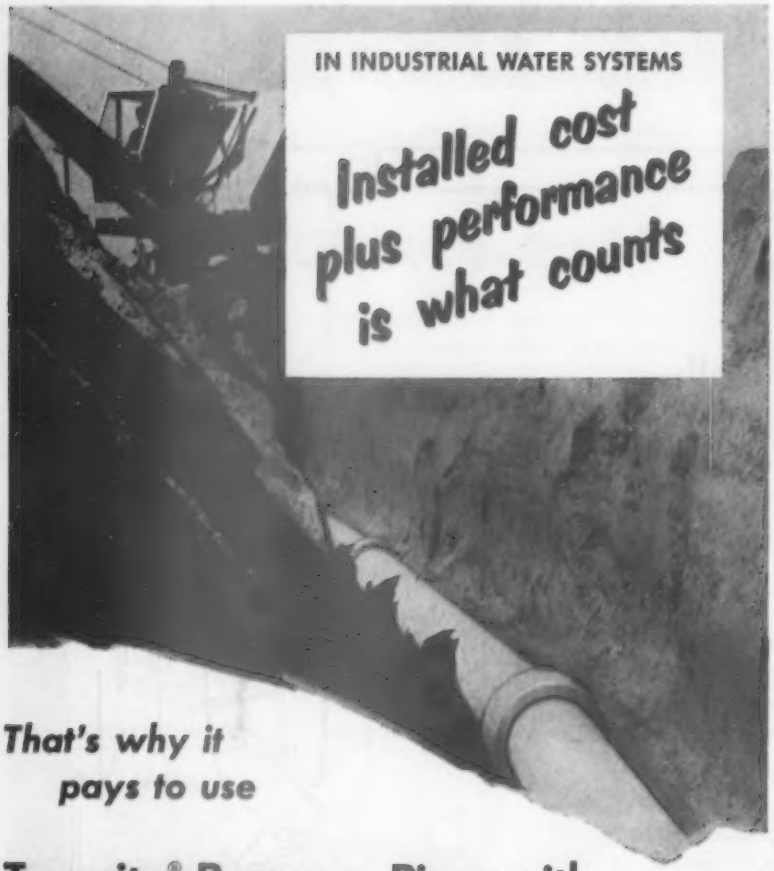
DURIRON has been proved by many years' service in schools, hospitals, laboratories, kitchens, plating rooms, and in many other applications where the economics of good building call for permanent drain lines.

A complete line of DURIRON bell and spigot pipe and fittings is carried in stock by leading wholesalers in principal cities throughout the country. Write for free bulletin PF/4a or see Sweet's Architectural File.

DURIRON is also available with split flange connections for pressure lines. Details are contained in Bulletin PF/2.

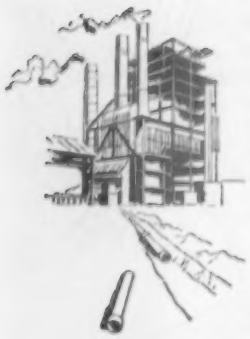
THE DURIRON COMPANY, Inc.
DAYTON, OHIO

DURIRON
LOOK FOR THE NAME ON EVERY PIECE



That's why it pays to use

Transite® Pressure Pipe with the Ring-Tite® Coupling



For further information about Transite Pressure Pipe and Ring-Tite Coupling, write to Johns-Manville, Box 60, New York 16, New York.

MEN RESPONSIBLE for successful water system installation and performance have found that Transite Pressure Pipe with the new Ring-Tite Coupling meets every requirement for industrial water lines. For example . . .

Installed cost is lower—Transite's light weight, easy handling and fast, accurate Ring-Tite Coupling simplify assembly and save time. May be installed even under difficult weather and terrain conditions. The Ring-Tite design automatically locks tight, forming a positive seal.

Performance is high—With Transite Pressure Pipe and the Ring-Tite Coupling, peak performance *can be counted on* year after year because of such engineering advantages as these: *Lasting* strength because of Transite's asbestos-cement, a strong durable material, highly resistant to corrosion . . . *Designed* tightness with the rubber rings of the Ring-Tite Coupling . . . *Assured* flexibility with automatic end positioning within the joint . . . *Locked in the groove* . . . rings can't blow out.

JM

Johns-Manville TRANSITE PRESSURE PIPE

With New *Ring-Tite* Coupling

For more about these products, circle item numbers on Reader Service card next to back cover.

93—Turret Lathe, numerically controlled, is automatically cycled; instructions on punched tape direct operating motions. Ideal for short runs, as it reduces set-up time and need for skilled operators; for multiple tooling on long runs. *Jones & Lamson Machine Co.*

94—Automatic Welders are for hidden or submerged arc welding. Line includes 3 new welding heads, controls and adjustments, accessories, 2 power sources—a choice for every job. Heads adapt to fixtures as complete unit or separate components. *Lincoln Electric Co.*

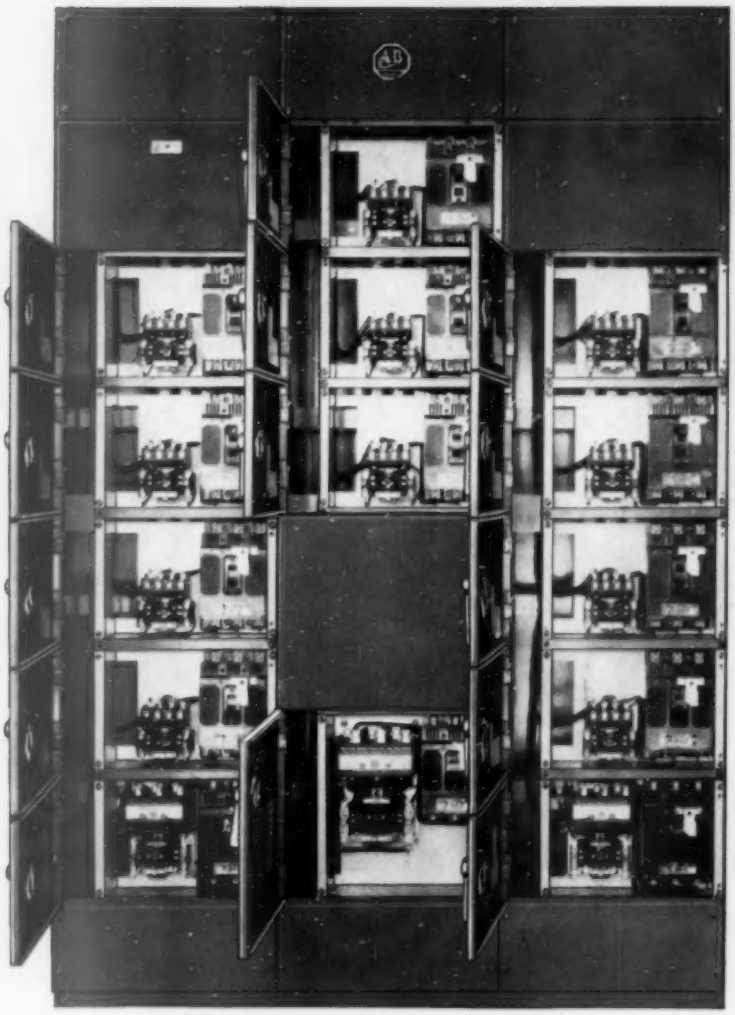
95—Materials Handling Valves, for vacuum transport piping systems, control flow of fine solid materials—boiler fly ash, other dusts. Self-feeding, non-plugging; positive shut-off, maximum capacity, minimum friction; easy to maintain. *Allen-Sherman-Hoff Co.*

96—Mechanical Sound Detector amplifies normally inaudible defect-caused noises. Locates broken, loose, worn, bent parts in reciprocating engines, motors, gear boxes, compressors, pumps, similar equipment; any size. Looks like doctor's stethoscope. *Burke & Co.*

97—High-Impedance Transformer is for electrical equipment requiring high *starting* and low *operating* voltage. Protects operating voltage against high initial current by reducing starting voltage automatically. 10 va. to 25 kva. *Nothelfer Winding Laboratories.*

Turn the page

ALLEN-BRADLEY



Allen-Bradley Control Centers

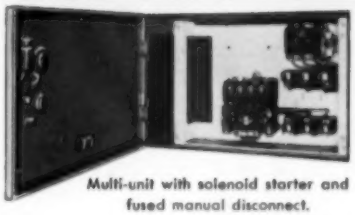
Into these multi-unit control centers is engineered all of the quality for which Allen-Bradley controls have earned their established reputation. The complete story is told in our 28-page bulletin on Allen-Bradley Multi-unit Control. It is a handy guide that will answer your questions about the various standardized units that will usually fit your specific motor control requirements.

Manual or automatic motor starters, reversing switches, relays, timers, circuit breakers, autotransformers, pilot lights, push buttons—all are built into sectionalized Allen-Bradley units, listed and described in Bulletin 798. Send for it, today.

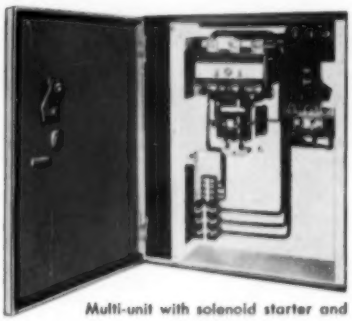
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
BULLETIN 798 MULTI-UNIT CONTROLS
QUALITY

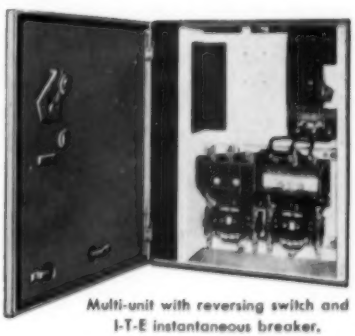
A few of the many standard units available for A-B Control Centers . . .



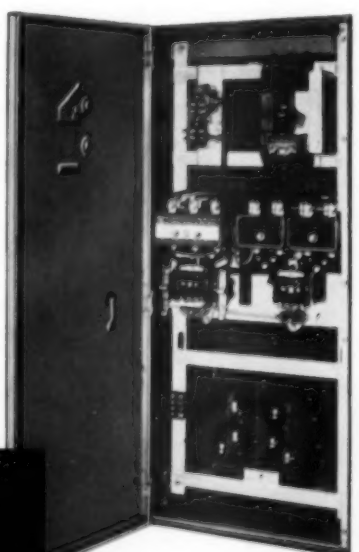
Multi-unit with solenoid starter and fused manual disconnect.



Multi-unit with solenoid starter and circuit breaker.



Multi-unit with reversing switch and I-T-E instantaneous breaker.



Multi-unit with autotransformer-type automatic motor starter.

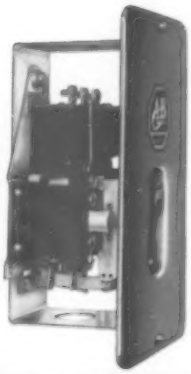
8-55-M

The Quality Line
of Manual Motor Starters

GENERAL PURPOSE

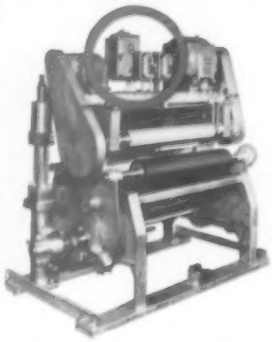
WATERTIGHT

EXPLOSION-PROOF



FLUSH TYPE

A-B manual starter, in NEMA 1 general purpose enclosure, on DeWalt metal cutter.



A-B manual starters, in NEMA 4 watertight enclosures, on Stehling fleshing machine.

A-B manual starter, in NEMA 7 explosion-proof enclosure, on Hilco oil reclaimer.

A-B manual starter, in Type 1B1 flush mounting, on Noble & Westbrook shell marker.

The popularity of Bulletin 609 manual starters rests on the following facts!

1—They are so simple. Few moving parts mean few chances for trouble.

2—Quick-make and quick-break switching action prevents contact "teasing."

3—Double-break, silver alloy contacts need no cleaning or filing—they are always in perfect operating condition.

4—Use of "buttons" for ON and OFF switching is in line with operation of automatic starters and is convenient for machine operator.

5—The two solder-pot overload breakers provide continuously dependable and accurate motor overload protection.

Be sure to send for a bulletin describing the full line of A-B Bulletin 609 manual across-the-line starters up to 5 hp, 220 v; 7½ hp, 440-550 v.

Bulletin 646 autotransformer starter.

8-55-MR

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd.
Galt, Ont.

A-B Quality

ALLEN-BRADLEY

SOLENOID STARTERS

QUALITY

For more about these products, circle item numbers on Reader Service card next to back cover.

98—Hot Forgings Handler—a pair of steel fingers at end of a 10-ft. arm attachment—reaches into furnace, picks up hot forging, carries it between stages in process. Clamps, lifts, tilts, rotates, and side-shifts 1000-lb. forgings. *Automatic Transportation Co.*

99—Stepless Temperature Controller is for plastic machinery, electric furnaces, kilns, or other electric loads. Modulates power input so heat input is only equal to heat losses. Does so without contactors. Automatically varies input 3-90%. *West Instrument Corp.*

100—Photoelectric Control System operates over distances up to 100 ft. and affords speeds to 600 operations per min. Useful for long-distance materials handling; protection of large work areas; operation of doors, intrusion alarms. *Electronics Corp. of America.*

101—Repeat Cycle Timer is for design into automatic machines or process control. Applications include sign flashing, life testing, bag filling, refluxing, automatic weighing. Electronic Model 4 needs no warm-up; consumes no filament power. *G. C. Wilson & Co.*

102—Rotary Solenoid is for 60 cycle a-c. operation on standard voltages without use of rectifiers, transformers, etc. Unaffected by vibration and shock. Operates in any mounting position. Installed without levers and linkages. Eight sizes. *Lee Spring Co.*

Turn the page

New Handling System

increases production while eliminating two lines

In one of the automotive industry's newest plants, production of frames for 1955 models was lagging, even though 6 lines were being used. Then Planet engineers were consulted.

They designed and installed a new frame handling system which exceeds current production requirements, doubling the output of the old-style line. *Now only 4 lines are used.* In addition, quality has been improved.

Here's how the system operates. The component parts of the frame are delivered by trolley conveyor to a frame assembly conveyor where they are automatically positioned for tack welding. The assembled frame is then discharged on to the frame welding conveyor illustrated above.

Here the frames are automatically rotated, 90° at a time so that all finished welding is done on a horizontal plane as the frames move by each welding station. Frames are then automatically conveyed through checking, cleaning, and painting operations.

If you have a production problem, why not consult Planet Corporation engineers? Write or phone today. There is no obligation.

PLANET CORPORATION
1814 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

"IT PAYS TO PLAN WITH PLANET"

Fletcher brings dust "down to earth!"

Pangborn Dust Control collects valuable material to be sold as soil conditioner

The H. E. Fletcher Co., West Chelmsford, Mass., produces a wide variety of granite products. When Fletcher recently expanded plant operations, the firm installed Pangborn Dust Collectors on the recommendation of an already-satisfied user of Pangborn Dust Control. The results at Fletcher have been extremely gratifying. Costs have been cut in three ways: valuable collected material is sold as soil conditioner, the life of expensive machinery is lengthened by reducing dust damage, and plant housekeeping is cheaper and easier. Other benefits, according to the company, include the reduction of health hazards to employees and the improvement of product quality.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 2100 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

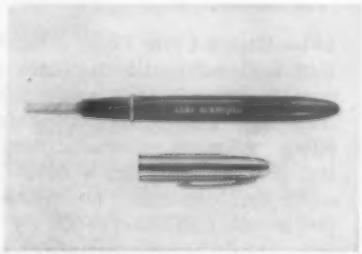
Pangborn
CONTROLS DUST

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

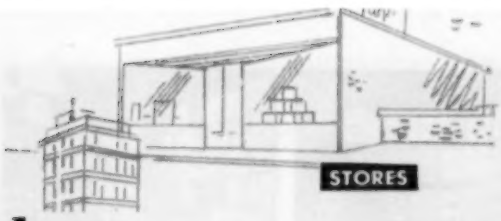
103—Fume Scrubbers clean acid and other corrosive fumes in pickling, electroplating, anodizing, etc. Eight sizes, 1000-30,000 cfm., in glass-reinforced plastic, rubber-lined steel, carbon steel, and other alloys to suit acids handled. *Heil Process Equipment Corp.*

104—Magnetic Motor Control Relay is for across-the-line starting of motors and control of heating and refrigeration equipment. The 9100 has large current-carrying capacity. Small, quiet operation, low coil power, easily installed. UL-approved. *Leach Corp.*

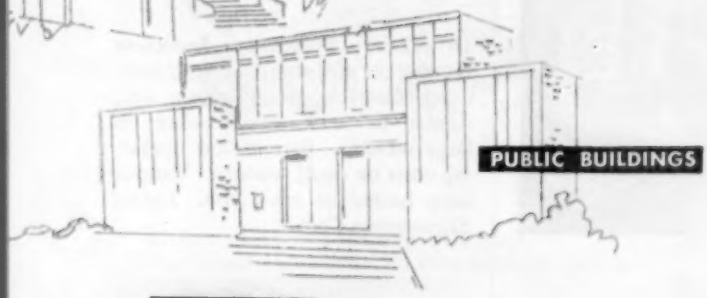


105—Contact Burnisher is a pocket-size, clip-on type. Abrasive removes dust, grit, carbon with minimum removal of contact metal. Polishing action of Model 160 decreases frequency of contact maintenance. No oil film, grit, dirt, or contact filings. *Adre Co.*

Turn the page

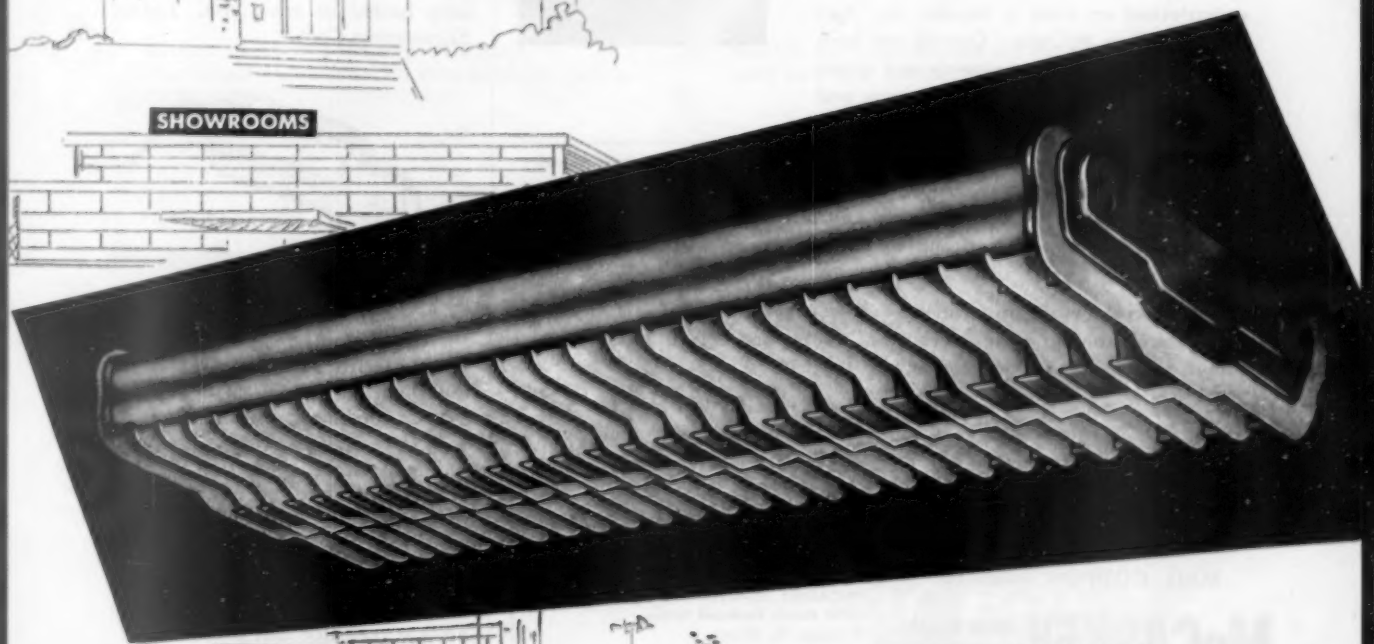


You see it everywhere . . .



Wheeler FLO-LINER

Proven high efficiency fluorescent lighting for initial installation or replacement. Wheeler-engineered for comfortable low brightness at all normal viewing angles.



BANKS, HOSPITALS,
RESTAURANTS, HOTELS,
THEATERS. INSURANCE COMPANIES

FOR FURTHER INFORMATION,
WRITE FOR BULLETIN NO. 92

WHEELER REFLECTOR COMPANY
275 Congress Street Boston 10, Mass.
Distributed Exclusively through Electrical Wholesalers

CLEVELAND WORM AND GEAR COMPANY SHOWS HOW

McCaskey Control System Cuts Tool and Operating Costs

Operating costs went down and efficiency went up when the Cleveland Worm and Gear Company started using McCaskey Tool Crib Control.

Mr. Edward Mason, Tool Engineer of Cleveland Worm and Gear and its affiliate, The Farval Corporation, gives the lowdown.

"In both companies, your system revealed we were overstocked on little-used tools and understocked on some in regular use. And since installing McCaskey Controls we have practically eliminated emergency tool orders even though a large part of our worm and gear production is custom-made.

It has helped us increase the number of tools available without additional purchases by preventing employee hoarding. The installation of the McCaskey Tool Location Board has reduced production delays. Now tools are seldom lost or misplaced and waiting at the crib window has been eliminated.

You have even helped us cut down on breakage. McCaskey Broken Tool Reports are analyzed as an indication of trouble and unusual breakage is reported to the proper department."

McCaskey Tool and Gage Controls and other Control Systems can offer you comparable benefits. What kind would be best for your operation? Send coupon today for full details.

Find out how McCaskey can help you regardless of your plant size or products.

MAIL COUPON TODAY!

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS MAINTENANCE • COSTS

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VICTOR ADDING MACHINE CO.

Manufacturers of Business Machines Cash Registers, Business and Industrial Systems, Electronic Equipment, Electri-Cars.

Victor Adding Machine Co.
McCASKEY INDUSTRIAL DIVISION
3900 North Rockwell Street
Chicago 18, Illinois

Please send me your new booklet, "How Tool Costs Were Cut 12 Ways in 20 Plants".

Name .....

Position .....

Company .....

Address .....

FMM-10-55

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

106—Air Diffuser provides draftless air conditioning and uniform temperature control. Perforated ceiling panel diffuses air vertically, at low velocity, with gentle motion. "Modular Multi-Vent" panels for mounting above ceiling. *Pyle-National Co.*

107—Low - Frequency Induction Heating is accomplished with coils using 60-cycle, single-phase a-c., similar to units usually used on large sections. Permits low operating costs on small sections. Various sizes heated in same coil. *Loftus Engineering Corp.*

108—Electric Metal Shears, heavy-duty, cut up to 16-gage steel, to 0.06-in. thickness. Stroke length is 3/32 in., 2500 per min. Minimum radius of circle is 1-in.; smaller diameters in softer and thinner materials—by cutting counter-clockwise. *Mall Tool Co.*

109—Electronic Timer has built-in voltage regulator that overcomes effect of line voltage variations. Timed interval varies less than 2% of full scale for any line-voltage change between 95 and 125 volts. 6 operating styles available. *Farmer Electric Products Co.*

Turn the page

Manpower's amazing and here is the proof:
When shipping costs grew, the boss raised the roof . . .

Now the roof's back in place and the future looks bright,
Swift **RAILWAY EXPRESS** keeps his shipping costs light.

The big difference is

Whether you're sending or receiving, whether your shipment is big or small, and whether it's moving by rail or air—you'll find it pays to specify Railway Express. It makes the big difference in speed, economy, and safe, sure delivery.

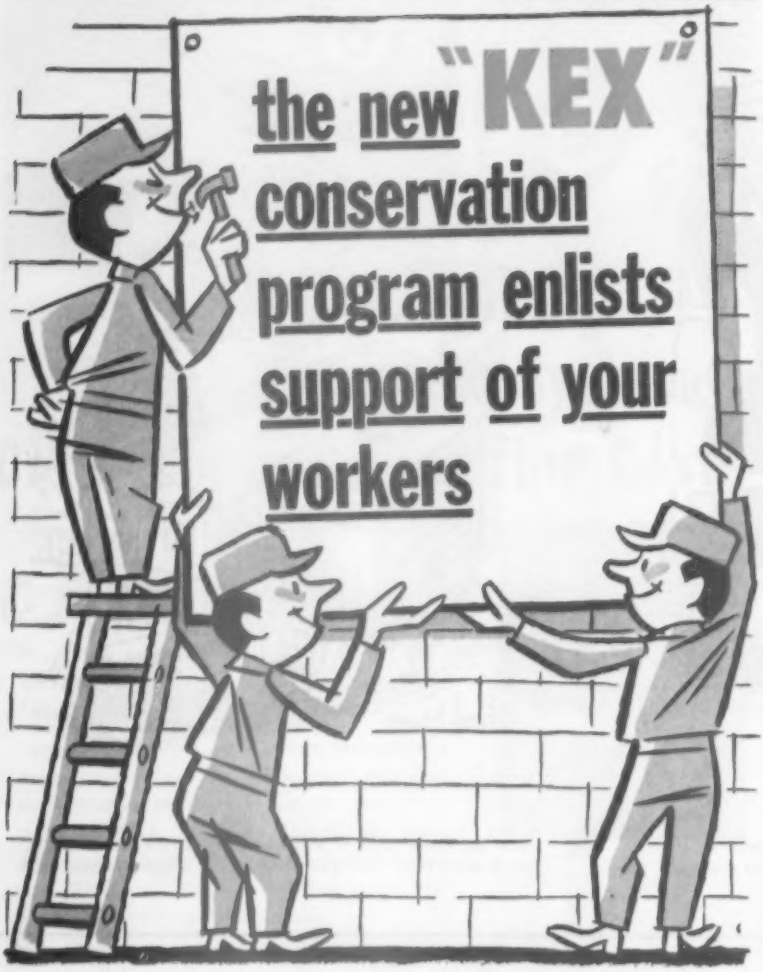
• • •

Railway Express uses the facilities of some 480 independent and competitive transportation companies in the movement of express traffic. It's free enterprise at its best, putting at your service one-third of a million miles of co-ordinated rail, air, water, and truck routes that connect all America.

RAILWAY EXPRESS AGENCY

. . . safe, swift, sure

CONSERVATION NEEDS COOPERATION



A NEW METHOD of preventing waste has just been developed by the "KEX" National Service. It's a powerful tool in bringing the importance of conservation right to your workers . . . *while they work!*

DESIGNED FOR YOU. It's a complete, compact plan that fits your operation like a glove. Here's the *practical* way to improve the handling of your materials and equipment.

EASY TO ADAPT. Let your "KEX" distributor show you how this *free* extra "KEX" service can work for you. Look in your Classified Directory (under Wiping Towels) for your nearest dealer, or write to "KEX" National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE

REG. U.S. PAT. OFF.

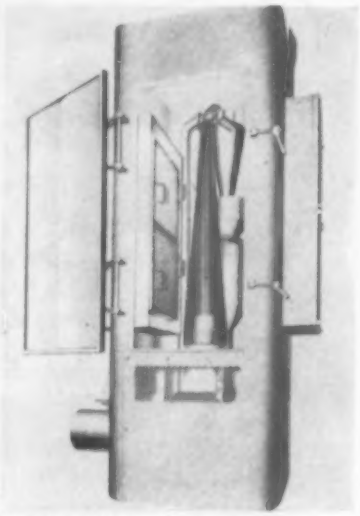
KEX

It isn't Kex unless it's imprinted with the Kex name

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.



110—Package Dust Collector removes all solids, most condensable fumes. Louvered cone removes coarser and medium particles; one or more fiber filter packs remove submicron particles. Type G.W.F. Aerodyne in 1000-10,000 cfm. *Green Fuel Economizer Co.*

111—Fluorescent Tube Racks permit stacking long, narrow, fragile cartons to ceiling height. Steel racks are 5-in. wide, 4-in. deep; 5-, 6-, or 7-in. high. Bolted units can be installed one on top of another. Capacity per shelf is 625 lb. *Frick-Gallagher Mfg. Co.*

Turn the page

It takes no investment to give your employees this wanted convenience

Costs you nothing (yet makes a profit)—and does so much for sound employee relations.

At work, as at home and everywhere else, people want refreshment. So universal is this desire, it is fast becoming an accepted practice in American life.

Of all beverages in America, cola is the most popular. And Pepsi is by far America's fastest growing cola drink. Why not give your employees this wanted convenience? Profits can be used for many desirable purposes.

And remember, Pepsi on the job supplies an important addition to your safety program. A stop for refreshment eases tension—and that's a safety factor.

Write today to the address below. We'll be happy to discuss this important program with you.

SOUND EMPLOYEE RELATIONS include:

- **Air Conditioning**
- **Better Lighting**
- **Health and Insurance Benefits**
- **Safety Programs**

And

REFRESHMENT ON THE JOB

These are just a few of the many Vending machines made by leading manufacturers. There are many more, of different designs and capacities, available to fit your needs.

Industrial Sales Division

Pepsi-Cola Company

3 West 57th St., New York 19, N. Y.

ARRO ARRO ARRO ARRO

Always Specify ARRO

You, too, will put your stamp of approval on the Arro line when you use any of Arro's devices for solving your drilling and anchoring problems.

Always Specify ARRO

See your industrial, hardware or electrical supplier

ARRO EXPANSION BOLT COMPANY
1420 Boone Ave., Marion, Ohio

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

112—Feed Rate Meter reads travel speed of cutting tools, carriages, and heads in low-speed turning, boring, and grinding. Indicates speeds from fraction of in. per min. to 5, 10, and 20 in. per min. Overspeed will not damage pickup or indicator. *Maico Co.*

113—Rubber Dock Bumpers create shock-absorbing buffer against truck impact; protect building and cargo. Mount on new or existing docks by bolting steel plate to wood, steel, concrete. Facing is rugged, scrub-proof, abrasive-resistant. 12-48 in. *Karl A. Herman Co.*

114—Pallet supports 3000 lb., but weighs only 28 lb. Molded of Bakelite polyester resins reinforced with glass fiber. Resists wear, abrasion, impact, oils, grease, acids, alkalies. Pallets nest. Two used together give double strength. *Firmaline Products, Inc.*

Turn the page

7 benefits received by switch to STANOSTAMP *Compound C*

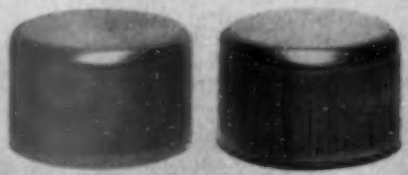
Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard Oil lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

The results add up to this: There is a combination in the field of industrial lubrication that is hard to beat. It is (1) Standard Oil lubrication specialists capable of giving technical help and (2) Top quality products *that deliver results.*

STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work produced using STANOSTAMP.



Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this forming compound. Scoring of dies as well as work occurred before switch.

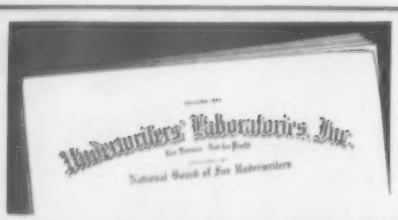
STANDARD OIL COMPANY
(Indiana)

STANDARD

In Hazardous or Coded Areas Specify RESOLITE FIRE-SNUF The Only Fiberglass Panel Labeled by Underwriters'

Fire-Snuf Panels are the *first* and *only* translucent, fiberglass-reinforced panels to be listed by Underwriters' Laboratories, Inc. They carry the UL label as evidence that they have and are continuing to meet Underwriters' rigid specifications.

They should be specified for skylights, sidewalls, partitions and glazing where fire hazards are unusual or codes call for a flame spread rating of below 75. This rating is equivalent to the Building Officials Conference of America (BOCA) classification of "slow burning" or "fire retardant." These panels are self-extinguishing and will not support combustion.



Complete test reports on the fire hazard classification of Fire-Snuf by Underwriters' Laboratories Inc., are available from the manufacturer on request.

Made with fire-retardant Hetron* polyester resin, Fire-Snuf panels retain all the best features of standard Resolite—shatterproof safety, strength, translucence, stability and load bearing characteristics.

*® Hooker Electrochemical Co.

Fire-Snuf is molded in flat panes for glazing and in all standard Resolite corrugations in lengths up to 13 feet and widths up to 42 inches. For additional information consult your distributor or contact

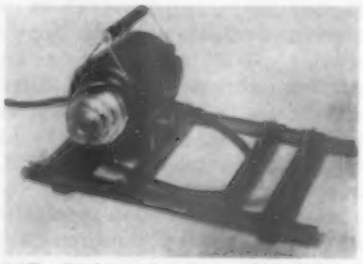
RESOLITE Corp.
Box 532, Zelienople, Pa.
Office and Warehouse, CHICAGO, ILL.
Export Office, HOUSTON, TEXAS
Distributors in principal cities, U. S. and Canada

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

115—Hydraulic Lift Truck is for double-face pallets; also for other pallet handling. 4000-lb. "Turnabout" has interchangeable forks: 24-48 in. standard; 54-72 in. special. Safety valve prevents overloading. No-drop handle. *Rack Hydraulic Equipment Corp.*

116—Fiber Glass Filter is a throwaway cartridge that fits standard containers. High chemical and temperature resistance; non-absorbent; lint-free filtration. "Glas-Kleer" is provided with variable density. 2, 10, 25, 50 micron grades. *Porous Plastic Filter Co.*



117—Universal Motor Mount eliminates locating and drilling holes in work benches. Pulleys can be quickly aligned, belt tension easily adjusted, tools attached for direct drive. For fractional hp. motors and small gas engines. 10-, 20-, 20-in. portable. *Arco Mfg. Co.*

118—Heat Sheets of glass fiber treated with inorganic material are lightweight, flexible; wrap around objects small as 1-in. diameter. Give uniform temperature, efficient heat transfer. Resist solvents, most acids, temperatures to 600 deg. F. *Electric Coatings, Inc.*

Turn the page

FLEXLOC AT WORK

Power Hack Saw Builder Fastens blade guides with FLEXLOC self-locking nuts. Eight of these one-piece, all-metal locknuts are used in this assembly. And they won't work loose, regardless of vibration.

You can get the same dependable service. FLEXLOCs come in a wide range of sizes, types and materials. They are stocked by leading industrial distributors everywhere. Ask your local man for Bulletin 866. Or write STANDARD PRESSED STEEL CO., Jenkintown 11, Pa.

• • •

Use FLEXLOCs anywhere:

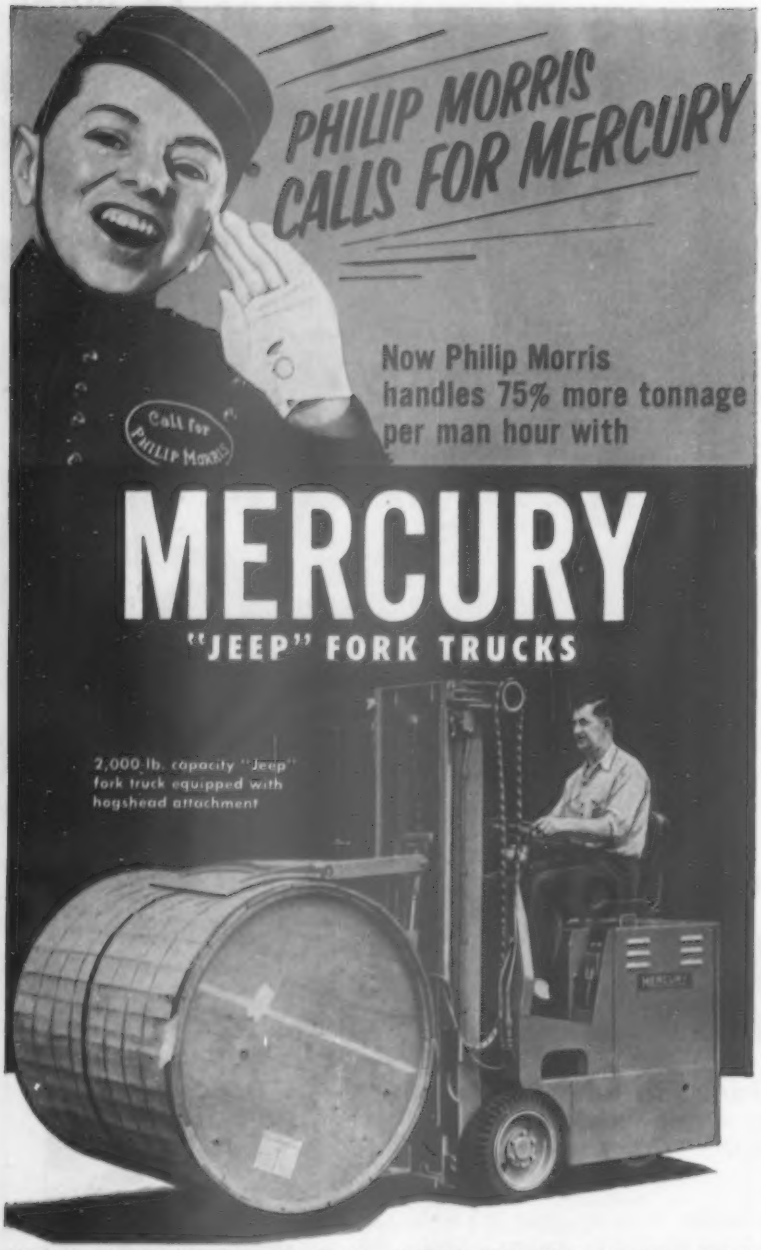
ON ROUGH BOLTS. FLEXLOCs smooth out bolt threads without damaging their own threads.

IN TEMPERATURES TO 550° F. in plated nuts and even higher in unplated ones. High temperatures do not affect FLEXLOCs. Nuts with non-metallic inserts fail under such conditions.

AS LOCK OR STOP NUTS. After at least 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC stays put.

REGARDLESS OF MOISTURE, OIL, DIRT AND GRIT. Even conditions like these do not affect the locking ability of FLEXLOCs.

FLEXLOC®
LOCKNUT DIVISION
SPS
JENKINTOWN PENNSYLVANIA


PHILIP MORRIS CALLS FOR MERCURY
Now Philip Morris handles 75% more tonnage per man hour with
Call for PHILIP MORRIS
MERCURY
"JEEP" FORK TRUCKS
2,000 lb. capacity "Jeep" fork truck equipped with hogshead attachment

MERCURY "Jeep" Fork Trucks equipped with special hogshead attachments now handle four times as many tobacco hogsheads per man-hour than originally handled. This new method permits double tiering in freight cars . . . virtually eliminates damage to hogsheads.

MERCURY fork trucks (all types and capacities) are constantly solving difficult handling problems in all industries . . . effecting savings that amortize initial cost of equipment in record time.

MERCURY "Fork Truck — Trackless Train" Systems are recognized industry-wide as the most economical and effective method of moving and stacking material.

CALL FOR MERCURY (as Philip Morris and many other nationally known companies have) . . . our engineers will show you, too, how to save time and money in vertical stacking and horizontal handling.

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

Send me free literature illustrating and describing Mercury fork trucks.

Name_____

Title_____

Address_____

City_____ Zone____ State____

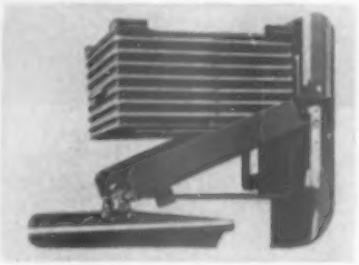
Mercury Manufacturing Company, 4110 South Halsted Street, Chicago 9, Illinois

FACTORY / EQUIPMENT NEWS

Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

119—Aerial Platform attains height of 65 ft.; permits unlimited maneuverability in basket. Boom rotates 360 deg.; lower and upper sections operate independently or together. Model I.G. 65 Giraffe capacity is 500 lb., any radius, any boom position. *Pitman Mfg. Co.*



120—Drop-Bottom Box may be used with positioning stand—bottom legs engage stand and drop bottom automatically opens. Or may be used with fork truck — reinforced box hanger engages mast of truck for controlled materials discharge. *Palmer-Shile Co.*

121—Plastic Pipe Fittings (unplasticized polyvinyl chloride) are available in 3- and 4-in. sizes; threaded and socket type. Enables economical erection of larger size PVC piping systems. Normal and high impact elbows, tees, couplings, flanges. *Tube Turns Plastics, Inc.*

Turn the page

They voted LYON 5 TO 1

Key executives of companies throughout the country have voted 5 to 1 for Lyon! They have given Lyon more first choice mentions than the next thirteen manufacturers combined!

A nationally known research company compiled those figures when they asked key men in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's *most diversified* and *most preferred* line of quality steel equipment. (A few are shown below.) Equally important, he can show you how to get the most out of steel equipment in terms of time, space and money.

LYON METAL PRODUCTS, INC.
General Offices: 1012 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities

Lyon also has complete facilities for manufacturing special items to your specifications.

LYON®

STEEL EQUIPMENT

for BUSINESS • INDUSTRY • INSTITUTIONS
also STEEL KITCHENS for THE HOME

A PARTIAL LIST OF LYON STANDARD PRODUCTS

- Shelving
- Lockers
- Stools
- Bin Units
- Kitchen Cabinets
- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- New Freedom Kitchens
- Display Equipment
- Toolroom Equipment
- Wood Working Benches
- Flat Drawer Files
- Revolving Bins
- Filing Cabinets
- Hanging Cabinets
- Folding Chairs
- Coat Racks
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

Scrubbing Italian Marble floor in 3M Company reception room. Flooring in other rooms is gray asphalt tile

3M Company picks MULTI-CLEAN floor maintenance equipment

When Minnesota Mining and Manufacturing Company erected its new Central Research Laboratory, it selected a MULTI-CLEAN MCV-220 Industrial Vacuum Cleaner, MCS-16 Scrubbing Machine and MC-19 Floor Machine to keep the building's 90,000 square feet of floor area bright and clean.

"We've used MULTI-CLEAN floor equipment for the past 8 years," says Ed Thompson, 3M Superintendent of Janitorial Services. "We now have 3 vacs and 12 machines on the job in our St. Paul building. With MULTI-CLEAN equipment, it takes 5 of our men only 1½ to 2 hours a night to scrub, wax, and polish up to 5,000 square feet of floor. We figure our MULTI-CLEAN machines and vacs *have cut our floor maintenance time by two-thirds* and we have nice looking floors all the time."

ED THOMPSON

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway, St. Paul 1, Minn., Dept. FM-105

Gentlemen: Send floor maintenance information on:
☐ Concrete, ☐ Asphalt Tile, ☐ Terrazzo, ☐ Wood, or ☐ _____. Also literature on: ☐ Floor Maintenance Equipment.

Name _____

Firm _____

Address _____

City _____ Zone ____ State _____

FACTORY / EQUIPMENT NEWS
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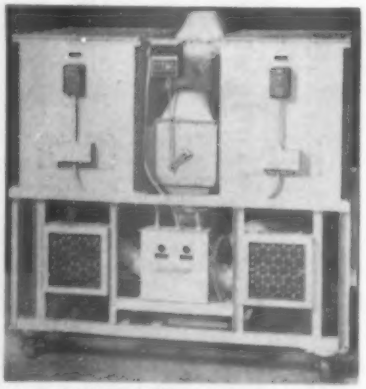
For more about these products, circle item numbers on Reader Service card next to back cover.

122—Diesel Engine, 15-hp. (at 2300 rpm.), is offered as a separate unit. The rugged DRP is a 4-cycle, air-cooled, solid injection full diesel. Includes as standard equipment 12-volt battery charging generator and 12-volt electric starter. *D. W. Onan & Sons Inc.*

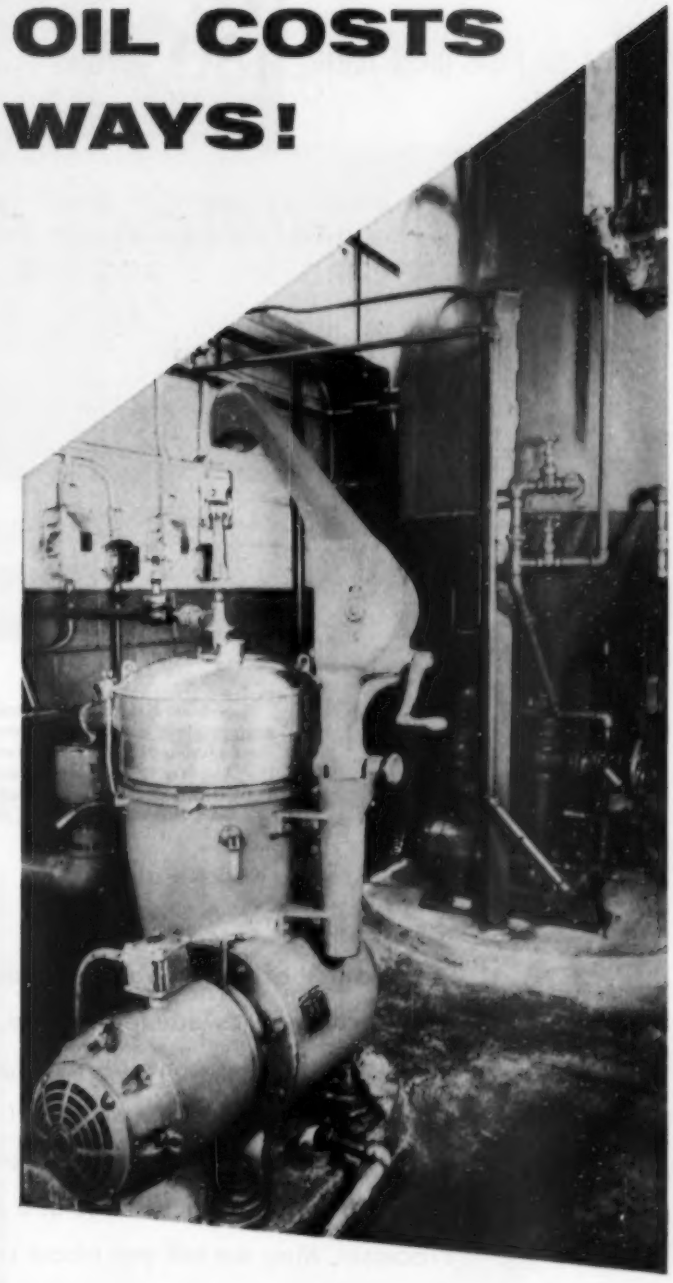


123—Dehumidifier, heavy-duty, adsorption type, maintains humidities low as 10% in areas to 69,999 cu. ft. over wide range of temperatures. Model T-150 requires only electrical outlets, minimum duct work. Can be caster-mounted for easy relocation. *Dryomatic Corp.*

124—Prefabricated Steel Buildings with tapered frames have extruded holes in purlins and girts. Provide location for connecting roof and wall sheets; speed covering framework. Frame can be assembled on ground, raised with minimum equipment. *Steelcraft Mfg. Co.*

Turn the page

HOW TO CUT CUTTING OIL COSTS ...TWO WAYS!



De Laval Cutting Oil Purifiers make it possible to use cutting oil over and over again... holding oil costs to "make-up" only!

And De Laval does still more!...reduces *hidden* costs of using incompletely purified oil...prevents excess tool wear...unnecessary down time...over-high reject percentage...undue wear on machine parts lubricated by the cutting oil!

De Laval Cutting Oil Purifiers *make* money by *saving* money. Get all the facts. *Write today for De Laval Bulletin FC.*

DE LAVAL

Purifiers and Clarifiers for Factory Oils

THE DE LAVAL SEPARATOR COMPANY Poughkeepsie, New York • 427 Randolph St., Chicago 6 • DE LAVAL PACIFIC CO. 201 E. Millbrae Ave., Millbrae, Calif.

"One day we were using 14 hand sprayers ...the next day, 2

"One day we were using 180 gallons of paint ...the next day, 75

"Fantastic?" Not exactly. It's a typical, on-the-job-example of the savings made possible with the

RANSBURG NO. 2 PROCESS

Electrostatic Spray Painting

And, in this instance* production was increased; quality of the work improved, and rejections cut to practically nothing.

*Fluorescent Fixtures of California, in their modern plant in South San Francisco, uses the Ransburg No. 2 Process Reciprocating Disc Atomizer to paint their popular line of ALL-BRITE lighting fixtures. The quotes above are from Works Manager, R. H. Shaffer.

Regardless of the type of product you manufacture, if it's painted ... and, if your production justifies conveyorized painting, you should look into the savings (and improved quality) which can be yours with one of the Ransburg Electrostatic Painting Processes. May we tell you about complete Ransburg services?

Dept. FM

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

FACTORY / EQUIPMENT NEWS

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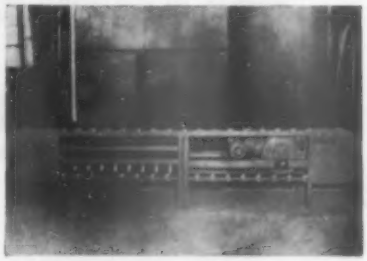
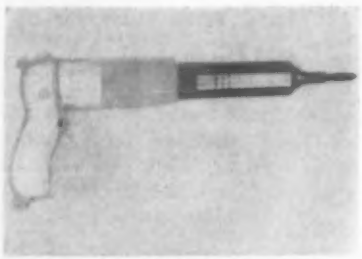
For more about these products, circle item numbers on Reader Service card next to back cover.



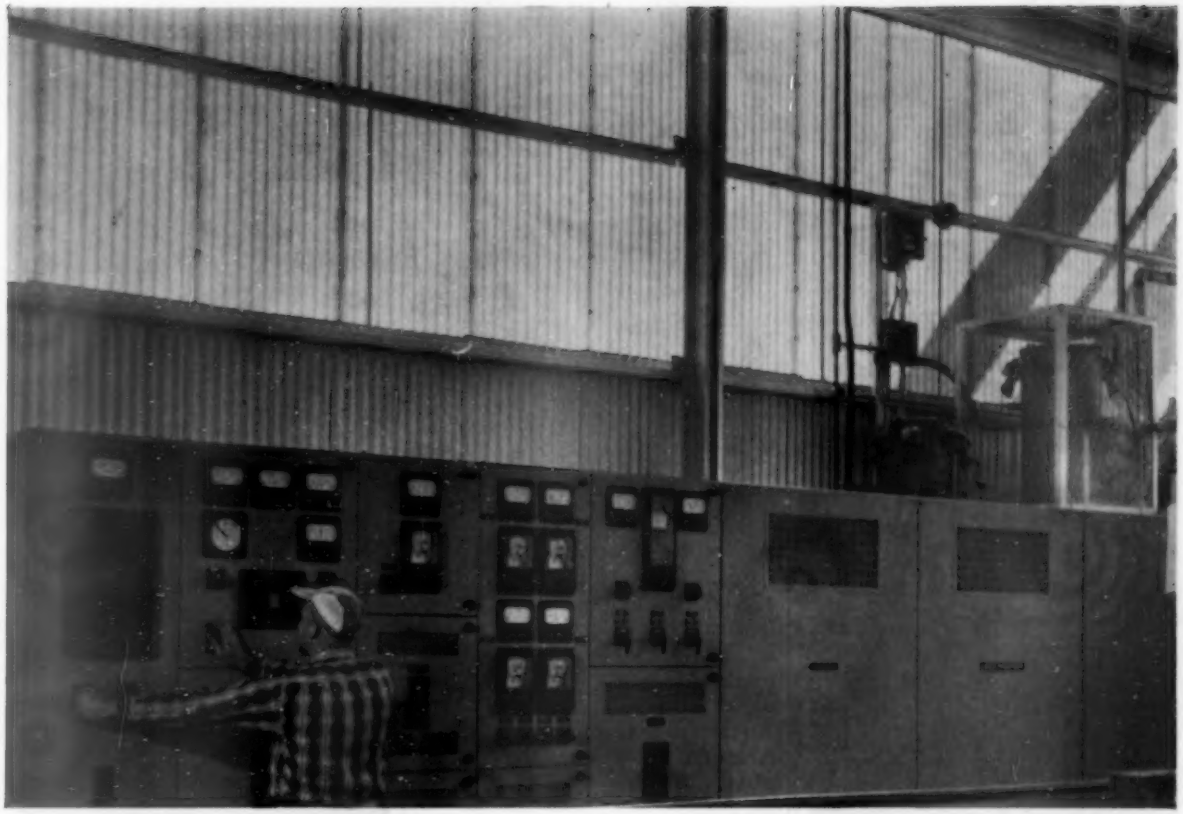
125—Steel Belt Conveyor is for heavy-capacity jobs (to 300 lb. per sq. ft.) under severe operating conditions, such as through infra-red ovens, handling stampings, etc. Variable speeds, ratio of 3:1. Made to nearly any length; widths to 60 in. *West Bend Equipment Corp.*

126—Bulk Loader has short turning radius (7 ft., 4 in.), low center of gravity, good balance — ideal for swinging through boxcar doors, in and out of tight spots. Maximum lift of Model NL-50 is 7 ft., 6 in.; capacity 1250 lb., 15 cu. ft. *Napco Industries, Inc.*



127—Torque Control Clutch is for power screwdrivers. Torque control and accuracy without producing impact effect on screw or nut when released. Cannot be accidentally released by relaxed pressure of operator, or fluctuating power. Range of 5-85 in. lb. *Livermont, Inc.*

Turn the page



NEW LOW PRICES Reduce Corrulux® Daylighting Costs!

Where vandalism or industrial hazards make daylight costly in terms of broken windows, reduce maintenance expense with Corrulux. Daylight, filtered through Corrulux, is diffused . . . delicately tinted . . . gentle on the eyes. Corrulux is a special product uniformly reinforced with Fiber·Glass. It withstands severe impacts. It is easy to install in large panels. And in skylights, its great strength makes light work of snow loads.

Now it costs less than ever. Specify L.O.F. Corrulux and *be sure*.

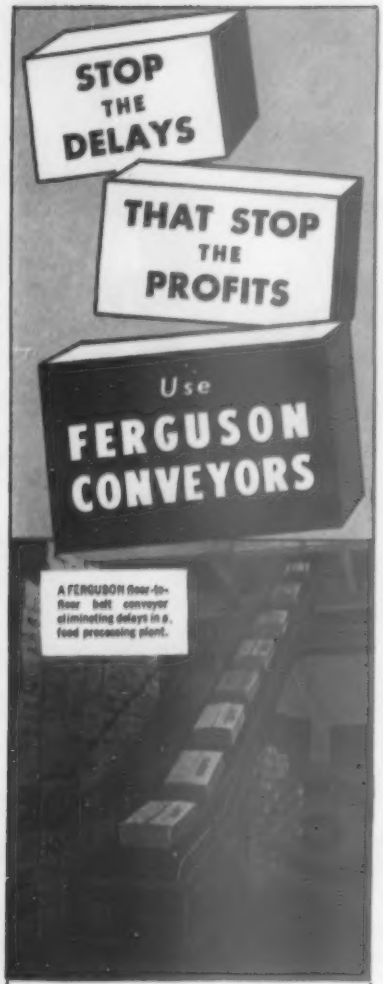
Write for **FREE FOLDER**

Corrulux Saves 4 Ways

1. On engineering.
2. On framing.
3. On installation costs.
4. On maintenance. For new and existing buildings.

L·O·F GLASS FIBERS Corrulux

Corrulux Division
L·O·F Glass Fibers Company
Dept. 52-105,
P.O. Box 20026, Houston 25, Texas



Company after company in almost every industry stop materials handling delays with FERGUSON CONVEYORS. And, they get more value per dollar spent because these conveyors:

- **Shorten Paths of Travel**
- **Reduce Congestion**
- **Coordinate Production, Inspection, Packaging and Shipping Lines**
- **Move Material More Directly**
- **Increase Plant-wide Efficiency**

Proof of performance is the constant number of reorders for FERGUSON CONVEYORS from satisfied users.

Write, wire or call today for details on FERGUSON power, roller or wheel conveyors that can stop the delays in your plant.

HARRY J. Ferguson COMPANY

143 WEST AVE., JENKINTOWN, PA.
Turner 4-4401

FACTORY / EQUIPMENT NEWS
Begins on page 158

For more about these products, circle item numbers on Reader Service card next to back cover.

128—Shear, air-operated, cuts cold ferrous and non-ferrous bars to 1¾ in. square or round. Type O-SC-20 operates from any standard air supply or compressor, at 60-125 psi. No motors or gears to maintain. Operates only while cutting. *Curry Air Shear Corp.*

129—Lift Truck will interest those with floor loading problems. Model FTP30-24 is equipped with pneumatic tires; offers greater flotation, reduced weight concentration, more even weight distribution. Lifts 3000 lb. Diesel, gas, or LP-gas engine. *Allis-Chalmers Mfg. Co.*

130—Bin Level Indicator is a paddle type for bins under pressure or vacuum; bins, chutes, conveyors handling materials containing large lumps that can "'bridge" over a diaphragm; bins handling materials that "rat-hole" and prevent operation of a diaphragm. Easily installed. *Bin-Dicator Co.*

CUT REFUSE DISPOSAL COSTS

THIS BURNER DOES IT!

This WILCO Refuse Burner at Kimble Glass Company, Vineland, N. J., consumes up to 12 cubic yards of plant trash in about 15 minutes and cost only $4,500. Nearly smokeless burning satisfies New Jersey's rigid air pollution laws. Fire safety is assured—no insurance penalty.

Big doors permit trucks to dump material directly into burner.

Forced Draft can be regulated for complete, rapid combustion and optimum burning under all conditions. Circular Draft and Syphon Draft provide moving air insulation for burner.

Three models, 14 sizes—one for every plant.

Write today for details, stating type and quantity of waste.

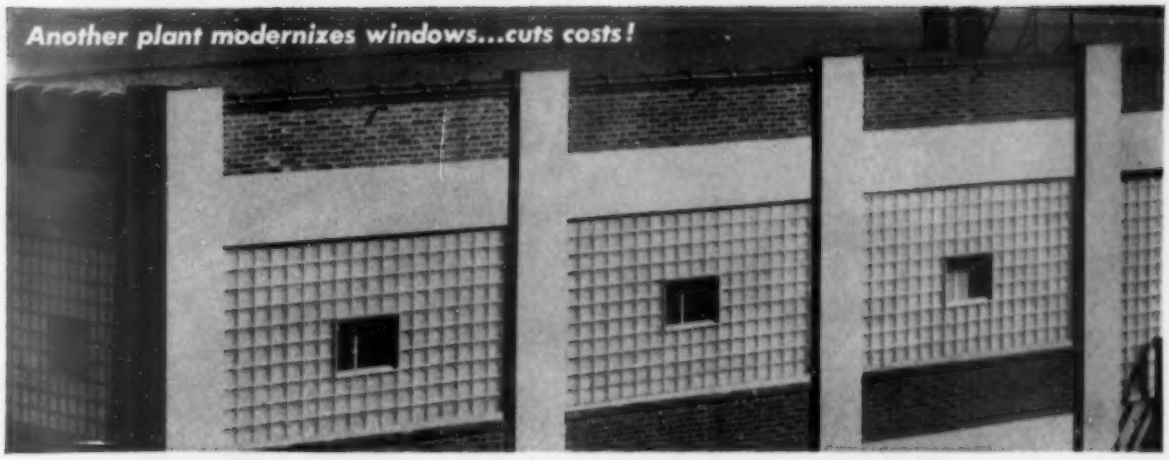
WILCO MACHINE WORKS
1301F No. Hollywood MEMPHIS 8, TENN. Phone 4-1188

WHERE TO BUY

FLUX FOR SODERING
SILVER SODERING
BRAZING
WELDING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

BOWERS BATTERIES
Always Better
BOWERS BATTERY & SPARK PLUG CO., READING, PA.



"We saved the cost of a new heating plant with PC Glass Blocks,"

says **E. W. Meyers, Jr.,**
President, Trion, Inc.,
Pittsburgh, Pa.

Trion, Inc. is a world-famous manufacturer of electronic air cleaning equipment, so naturally they didn't want dirt seeping into their plant.

The old steel sash let in dirt. And, it leaked so much air that the heating plant was inadequate. Trion licked both of these problems and got a better looking building to boot when they eliminated the steel sash and installed PC Glass Blocks.

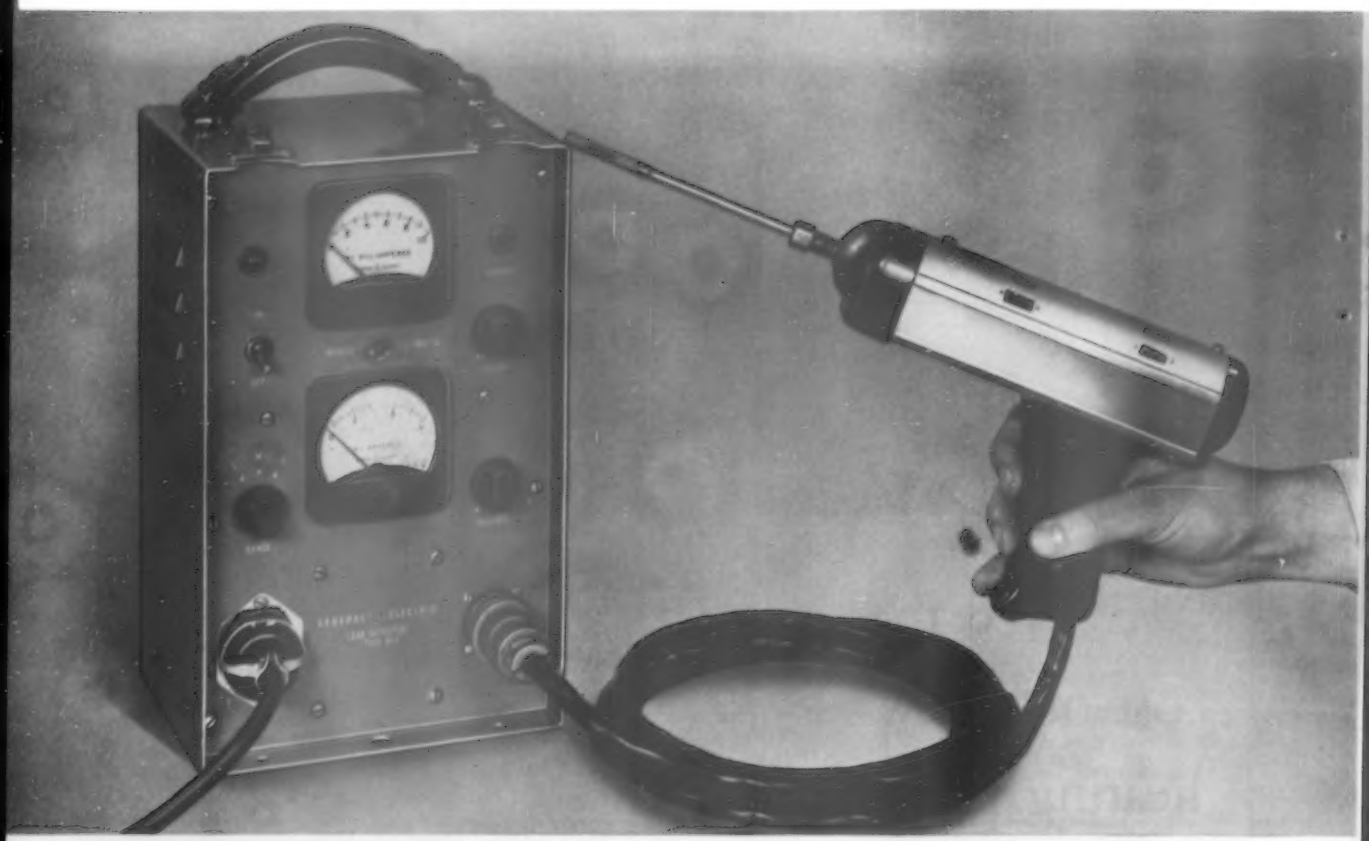
Mr. Meyers says, "We not only saved the cost of a new heating plant, but we reduced our heating bill as well. The PC Glass Blocks have eliminated dirt infiltration, and our building looks better than ever before."

In summary: PC Glass Blocks will improve the appearance of your building, give much better daylighting, and reduce dirt. They also cut heating and cooling bills because a PC Glass Block panel has the insulating efficiency of an 8-inch masonry wall.

NEW FREE BOOKLET "How To Modernize Old Windows" tells the complete story. Write to Pittsburgh Corning Corporation, Dept. N-25, One Gateway Center, Pittsburgh 22, Pennsylvania.

PC Glass Blocks

ALSO SKYTROL® AND FOAMGLAS®



1 HIGHLY SENSITIVE, the G-E Type H-1 leak detector will detect a leak of 1/100 ounce of "Freon"* a year. A versatile instrument, the detector is designed to simplify the locating of leaks in any closed system containing "Freon," or some other halogen compound; or any system into which such a compound may be introduced as a tracer. Price including detector unit, control unit, and power-supply lead is $604.50.** For further information, mail coupon below.

G-E LEAK DETECTOR SERVES INDUSTRY AS

Here's How Others Are Benefiting by Using the New Type H-1 Leak Detector

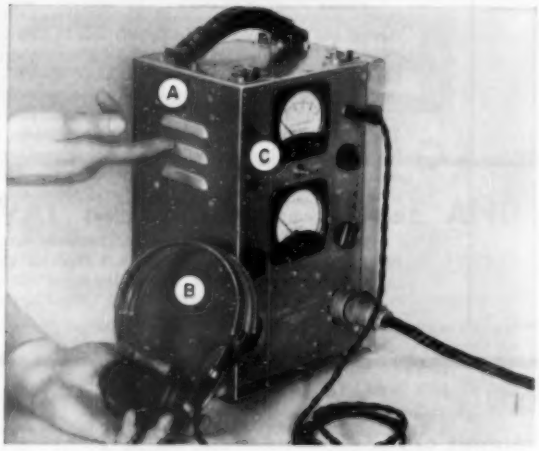
IN ASSEMBLY-LINE TESTING of Lincoln automobile air-conditioners, the General Electric Type H-1 leak detector is used to quickly and sensitively "sniff" all vital connections under the chassis and hood.

TO CUT REJECTS, the Angle Products Company, Cleveland, Ohio, checks their hydraulic oil and fuel tanks with the G-E leak detector. The new device has reduced the company's inspection time by 35%.

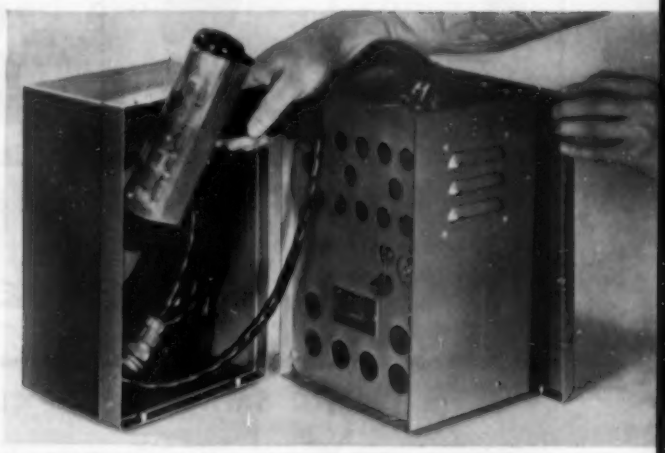
*Registered trade-mark, Kinetic Chemicals Div. of E. I. du Pont de Nemours & Co.
**Manufacturer's suggested retail price.

New, Dependable G-E Leak Detector Simplifies Locating Hard-to-find Leaks

EASY TO OPERATE—READILY PORTABLE—EXTREMELY SENSITIVE



2 **LEAK INDICATIONS** by variable-pitch loudspeaker (A), earphones (B), and instrument dial (C) assure a true leak signal. Earphones, not supplied, may be purchased from your radio-supply dealer.



3 **READILY PORTABLE,** weighing only 24½ pounds, the unit may be carried to where it is needed. Leads and probe may be stored conveniently in rear of control cabinet. Sturdy carrying strap adds to the portability of the instrument.

IMPORTANT TESTING AND INSPECTION TOOL

FREE DEMONSTRATION

SECTION E605-60
GENERAL ELECTRIC COMPANY
SCHENECTADY 5, N. Y.

☐ Please send me a copy of your bulletin on the Type H-1 Leak Detector (GEC-233).
☐ I would like a demonstration.

Name .....

Company .....

Street .....

City ..... Zone ..... State .....

FOR QUICK, ON-THE-SPOT TESTING for leaks in large power transformers and network protectors, the Georgia Power Company employs the new readily portable, easy-to-use G-E leak detector.

AN AID IN ASSURING FREEDOM FROM LEAKS, the G-E leak detector provides North American Aviation with a highly sensitive instrument for making extra-sensitive leak tests of aircraft fuel cells.

GENERAL ELECTRIC

PROTECTOSEAL—the one complete source of approved equipment for all flammable operations—PRODUCTION—STORAGE—DISPENSING

PRODUCTION OPERATIONS—*6 TYPES FOR WASHING AND CLEANING*

Machine Bench Can

Dip Tank

Wash Tank with Basket

Wash Tank with Drain Board

Air-Matic Parts Washer

Foot Treadle Dip Tank

Protectoseal not only supplies approved fire preventive equipment for every flammables location and application throughout the plant but is frequently able to offer a wide choice of types and accessories for individual applications. This is especially true in production work where special designs have been developed which not only provide protection, but actually speed production processes. The six types for washing and cleaning operations range from a machine bench can for quick, convenient cleaning of small precision machine parts without loss of operator time to a large foot treadle dip tank for larger castings and assemblies which can be carried by hand.

If you have a special production problem involving flammables for which no equipment is available, consult our sales engineers or write direct to the home office. Our engineers will work with you to devise special equipment which exactly meets your needs.

SWABBING AND SMALL PARTS CLEANING

BENCH CAN

Equipped with dashers from 4½" to 12¼" to accommodate swabs of all sizes or to permit immersion of part in solvent for cleaning. Spring actuated, perforated fire baffle guards contents against fire, reduces evaporation losses and minimizes release of explosive vapors. Cover closes when not in use.

SWAB CAN

Saves refilling time. Auxiliary reserve tank replenishes solvent in dasher can. Designed for large scale swabbing operations, the swab can is fire protected throughout by perforated metal fire baffles.

PLUNGER CAN

Fire preventive dasher is depressed by hand containing swab to deliver a measured amount of the cleaning solvent. Moistening the cleaning swab is accomplished with one hand for cleaning with one easy motion while other hand holds piece being cleaned.

DRUM STORAGE AND DISPENSING

DRUM BUNG FITTINGS

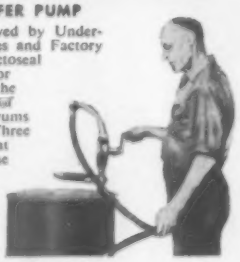
Guards against drum explosion and rupture from vapor pressure within drum—permits smooth, even withdrawal of liquid. Perforated metal fire baffle prevents exterior fire from entering drum, and fitting provides automatic pressure relief for safe storage and dispensing in yard or vault.

SELF-POSITIONING SWIVEL-SPOUT FAUCET

Prevents hazardous and wasteful leaky drum connections. Simply screw into drum and swivel pouring spout to correct position. No more forcing beyond thread connections to secure correct position. Ends the constant expense of replacement. Available with choice of gasket material.

SAFETY TRANSFER PUMP

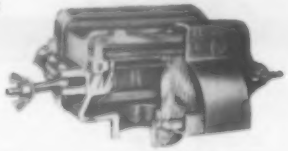
Tested and approved by Underwriters Laboratories and Factory Mutuals, the Protectoseal pump is designed for complete safety in the hazardous transfer of flammables from drums to use containers. Three built-in fire baffles at critical points: at the spout, above the bung adapter and at the strainer inlet within the drum. Static-proof hose. Fast shut-off provides measured pumping.



STORAGE TANK VENTING—*FOR FIRE PROTECTION AND VAPOR CONTROL*

NON-CONSERVATION TYPE VENTS WITH FLAME ARRESTERS

Provide maximum air-flow consistent with operating efficiency, positive fire protection and effective, low-cost maintenance. Light-weight, pressure-tight housings meet hydrostatic tests by Underwriters Laboratories and combine ease of installation with durability. Sturdy Protectoseal rectangular plate type flame arrester protects tank contents from propagation of fire and explosion within tank. Modern swing bolt design permits quick removal of vent covers and weatherhood for inspection or cleaning.

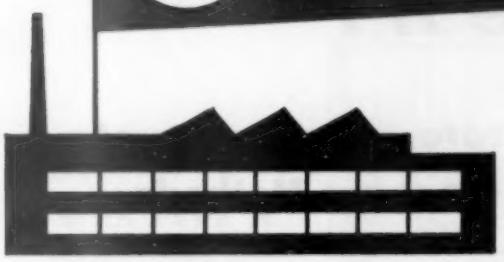


VAPOR CONSERVATION TYPE VENTS WITH FLAME ARRESTERS

Similar in design to Non-Conservation Type Vents but incorporate pressure and vacuum relief valves in the vent housing which conserve vapors to reduce costly evaporation costs. Valves retard intake of air and escape of vapors as tank normally breathes in and out. Flame Arrester plates are easily accessible for cleaning without disturbing original factory alignment.

PROTECTOSEAL PRODUCTS

PROTECT YOUR PLANT!



...from hazardous, flammable liquids all through the plant... speed production... conserve liquids... reduce non-productive time.

OVAL 1-GALLON STORAGE AND DISPENSING CAN

SPACE SAVER FOR QUANTITY STORAGE

Oval shape requires far less shelf space and makes for easier handling... four cans now stored in the same area formerly required for three ordinary cans. The long, thin, flexible spout facilitates direct filling of receptacles with small fill openings. Seam welded "unit" construction with preforated metal fire baffle in spout. Pouring controlled by squeeze-grip handle that actuates release valve and vent. Perforated double-wall metal fire baffle also protects filler opening. Available with ¼" and ⅜" flexible hose.

STOR'POR DOUBLE DUTY DISPENSER

Now, store and pour from this combination safety and supply can—provides safe storage and controlled pouring without hazard and loss through spillage. Save expense—use one container for both jobs. Underwriters Laboratories and Factory Mutual Laboratories approved. Easy working valve at base of flexible spout is operated by carrying hand and gives positive, spill-proof control when pouring.

Available with ¼" and ⅜" flexible hoses in 1 and 2 gallon sizes, and ⅜", ½" and 1" flexible hoses or rigid spouts in 3 and 5 gallon sizes.

SAFETY STORAGE CABINET

SAFE SPOTS FLAMMABLES IN STORAGE AREAS

Convenient at-the-job cabinets which save dispensing time, avoid scattering dangerous flammable throughout the plant and aid enforcement of regulations that all flammable must be stored and returned to controlled storage points. Designed and built in accordance with recommendations of the National Fire Protection Association, these cabinets enable the storage of up to 45 gallons of flammables within plant departments. Cabinet is of sturdy steel construction with 1½" air space between walls, non-sparking closure contact points and provision for vapor venting.

MAIL TODAY

Fill in coupon and attach to company letterhead for NEW Flammables Equipment Guide Chart illustrating and describing 30 PROTECTOSEAL Approved Fire Protective Safety Devices for Specific Storage, Handling and Production Operations.

West Coast Warehouse—Los Angeles, Calif.
In Canada—Safety Supply Co.—Toronto

THE PROTECTOSEAL COMPANY
1962 So. Western Ave., Chicago 8, Illinois

SEND "A GUIDE TO SELECTION AND USE OF PROTECTOSEAL EQUIPMENT FOR THE SAFE STORAGE, HANDLING AND USE OF FLAMMABLES." ALSO THE COMPLETE CATALOGS CHECKED BELOW.

☐ Safety Can Catalog
☐ Drum Storage and Dispensing Catalog
☐ Vent and Filling Storage Tank Catalog with Principles of Venting

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

AAF BETHER AIR

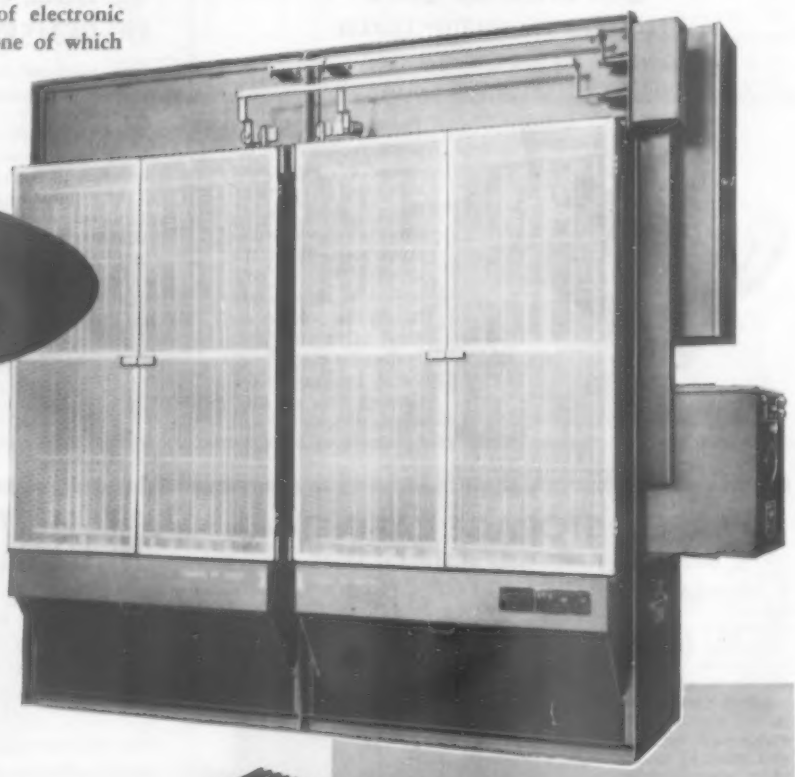
ELECTRONIC AIR

As You Like It!

Only AAF Offers Electronic Precipitators in a Range of Efficiencies with a Choice of Maintenance Methods

LOOK them over! This is AAF's line of electronic precipitators. All are highly effective in the removal of dust and smoke. But each was designed with a different group of needs in mind. Efficiency ratios, maintenance methods, air volumes, space requirements and initial cost are all vital factors that vary with individual jobs. That's why AAF offers you the proven benefits of electronic precipitators in three distinct "packages"—one of which is certain to solve your air cleaning problems in the manner and at the cost that insures a maximum return on your "clean air investment".

For complete product information, call your local AAF representative or fill out and mail coupon.



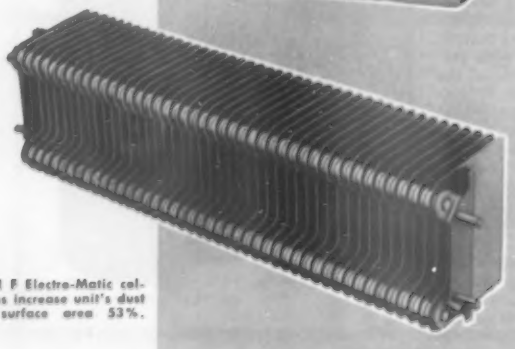
NEW!

AAF MODEL F

Electro-MATIC

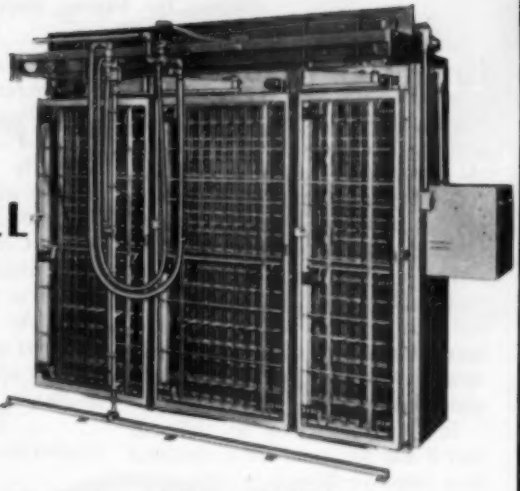
For 'Round the Clock Delivery Of Uniformly Clean Air

HERE'S the "robot" of modern electronic precipitators. The Model F Electro-Matic's high efficiency remains constant because of continuous, self-cleaning action. There's no dependence on the whims of a maintenance crew—no time out for washing down plates with hot water—no need for extra water and sewer connections. Electro-Matic's collector plates are automatically cleaned and re-oiled daily—are always in peak condition for the precipitation of dust and smoke particles. New type collector plates increase surface area 53% to further reduce possibility of dust build-up and insure constant low resistance.



New Model F Electro-Matic collector plates increase unit's dust collecting surface area 53%.

CLEANING

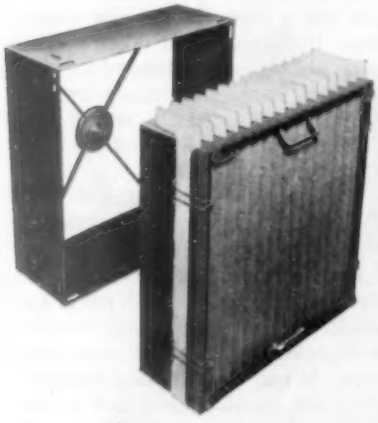


Electro · CELL

With TYPE H WASHER

Featuring "Push-Button" Maintenance

A stationary-plate type electronic precipitator which, with the addition of the Type H Washer, provides for the washing of collector plates by a set of traveling spray nozzles. The operation is fully automatic after starting button is pushed. If manual cleaning is preferred, plates may be serviced in place or easily removed for inspection.



Electro · PL

The Low Cost, Dry-Type Electronic Filter

This electronic air filter offers double protection in that its Airmat paper media continues to filter the air even if the electronic action becomes inactive. When the low cost Airmat paper has accumulated a full dust load, it is discarded and easily replaced with clean media which returns the filter to its original efficiency. An Electro-PL Unit consists of a frame and collector element. By riveting frames together, units are quickly assembled into straight bank or "V" arrangement.

AAF herman nelson

American Air Filter

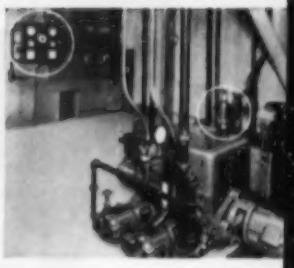
COMPANY, INC.

361 Central Avenue, Louisville 8, Kentucky

American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF herman nelson

BETTER AIR IS OUR BUSINESS!

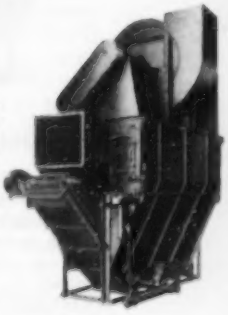


illinois

Selectotherm — an automatically controlled high vacuum steam heating system which, through single dial control, balances heat supply against heat loss to provide even, constant warmth.

herman nelson

Unit Blowers — a new, diversified line of direct and belt driven centrifugal fans available in a wide range of wheel diameters and capacities.



AAF Type N ROTO-CLONE—a high efficiency hydro-static precipitator designed for the collection of both coarse particles and extreme fines in excessive concentrations. Available in exhaust volumes up to 50,000 cfm.

American Air Filter Company, Inc.
361 Central Avenue, Louisville 8, Kentucky

I would appreciate receiving catalogs describing the following equipment—

- ☐ AAF Electronic Precipitators
- ☐ **illinois** Selectotherm
- ☐ *herman nelson* Unit Blowers
- ☐ **ROTO-CLONE** Dust Control Units

Name_____

Company_____

Street_____

City_____ State_____

BACKGROUND MUSIC FOR THE ACHING BACK?

OF COURSE!

Background music is one of the surest ways to ease tensions and relieve fatigue in Industry. Recent research studies* conclusively prove that it can create better employee relations—increase production by as much as 17%.

The new Ampex Sound System gives you background music on tape—superb quality at a surprisingly low hourly cost. No stand-by operator is needed. It's a completely automatic system built for years of trouble-free performance.

*Information available on request. Write to Dept. Y-2431

AMPEX CORPORATION

934 Charter St., Redwood City, California
Distributors in principle cities (listed in the classified phone directory under "Recording Equipment"). Canadian distribution by Canadian General Electric Company.

FACTORY | LABOR RELATIONS NEWS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc., Member, New York Bar

Engineers Different?

If you're required to negotiate with a group of engineers, put aside the old approach to labor relations and go to the bargaining table with this key idea in mind: Engineers want to be treated differently from rank and file workers. The engineers have been doing a slow burn for years — just because the rank and filers have been catching up with them — and now they want to be put in a separate class.

In their effort to be different they'll ask for (and have obtained from employers) such benefits as:

. . . *Payment of dues for membership in professional societies* — not not so much for the money, but for prestige.

. . . *Time off for meetings of professional societies* — but here the engineer is willing to pay for the meetings as a rule.

. . . *Partial (or full) payment* of *instruction fees* if the course taken will help them in their work with the employer.

. . . *Leaves of absence to continue education* on a full-time basis.

These are some of the demands you can expect from them — but whether or not your engineers are unionized, for the sake of industrial peace keep in mind they're "different," and build them a separate pedestal of different clay.

No GAW for IUE G-E Workers

It's a "splendid settlement" said I.U.E. President James B. Carey and General Electric Vice - President Lemuel Bouleware in unison as they shook hands on their new contract effective last Aug. 15.

Significantly absent was the GAW requested at the outset by the union. But gains won by the union make an attractive offset to this demand. (Besides, the parties agreed that in 1958 the contract can be opened for 30 days for another look at the GAW).

Chief labor gain was a 3% annual increase for the next five years. Other important items:

. . . *A cost-of-living clause* giving quarterly adjustments to reflect changes above the cost of living for Sept. 15, 1955.

. . . *Catastrophe medical insurance* which can pay an employee as high as $10,000 for hospital care.

. . . *No more contributions to pensions* after Oct. 1, 1958, for employees whose earnings are less than $4200.

. . . *Life insurance* of twice the employees' straight time pay.

Sidewise Transfers Not So Simple

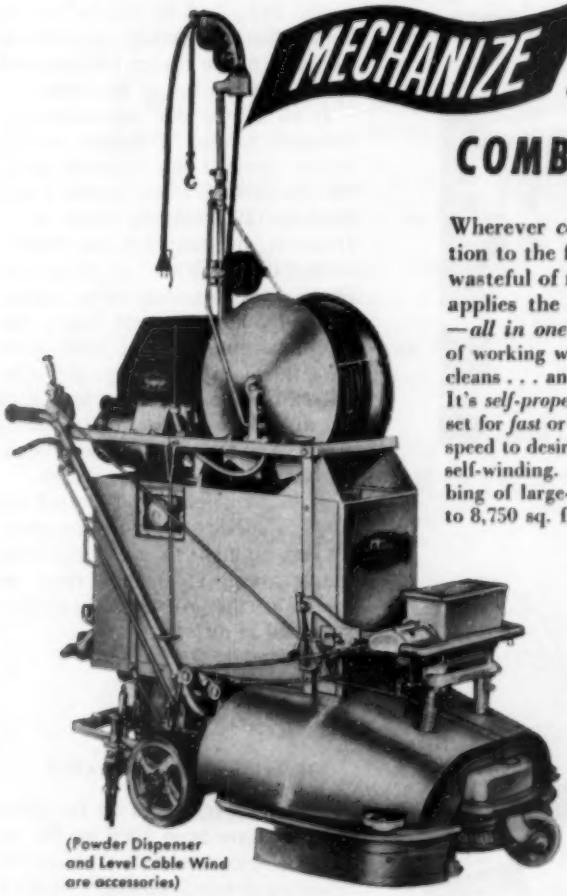
If your union contract has a departmental seniority clause, you can't toss it out very easily. But it sure can put a crimp in sidewise transfers. If your contract doesn't have such a clause, and a demand for one is made, here's one reason for resisting it. It's straight out of the case files of the Lewisburg Chair Company (Connecticut).

Lewisburg assembles dinette sets. One of the workers was a displaced Czechoslovakian *cabinet maker* who had taken the job of press operator because he couldn't find a job in his trade. Recently, Lewisburg thought it might be a good idea to make table tops. It had another good thought! Why not transfer this Czech to the new work—where he'd use his skill and get the same money.

It was a good idea—until the union heard about it! The union argued that the worker was not hired as a cabinet worker. It also argued that the contract provided for departmental seniority. A worker had a right to choose his job, it said. And this Czech could stay in his own department where he was senior. So the case went to arbitration. The arbitrator looked high and low in the contract for a departmental seniority clause, but couldn't find one. Instead, he fastened his eyes on the management rights clause and

Let's not clean away dollars and man-hours with costly, inadequate floor care

MECHANIZE *your floor-cleaning with a* COMBINATION SCRUBBER-VAC!



(Powder Dispenser and Level Cable Wind are accessories)

Wherever *combination-machine-scrubbing* is the practical solution to the floor-cleaning problem, any lesser, slower method is wasteful of money and manpower. A *Combination Scrubber-Vac* applies the cleanser, scrubs, flushes if required, and picks up —*all in one operation!* Maintenance men like the convenience of working with this single unit . . . the thoroughness with which it cleans . . . and the features that make the machine simple to operate. It's *self-propelled*, and has a *positive* clutch. There are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs quietly. Cable reel is self-winding. *Model 213P Scrubber-Vac* at left, for heavy duty scrubbing of large-area floors, has a 26-inch brush spread, and cleans up to 8,750 sq. ft. per hour!

Finnell makes *Scrubber-Vac Machines* in a full range of sizes—for small, vast, and intermediate operations. From this complete line, you can choose the size that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that you can lease or purchase a *Scrubber-Vac*, and that *a Finnell floor specialist and engineer is nearby* to help train your maintenance operators in the proper use of the machine . . . to recommend cleaning schedules for most effectual care . . . and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2510 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

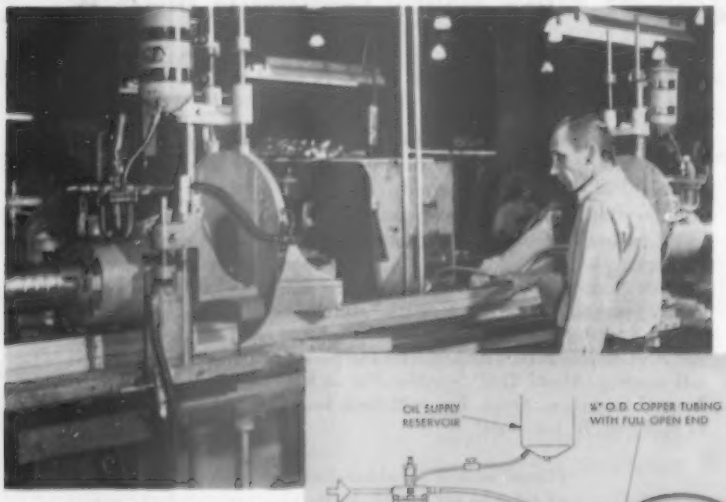
BRANCHES IN ALL PRINCIPAL CITIES

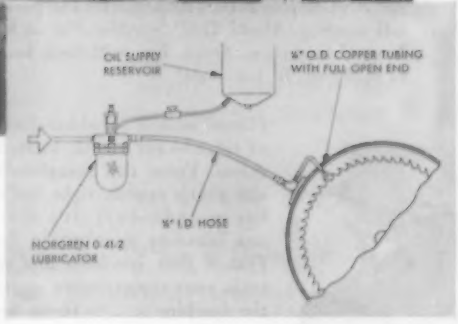
NORGREN Oil-Fog Lubrication
increases saw blade life 20 times
AT ALUMATIC CORPORATION of AMERICA

This prominent manufacturer of aluminum storm doors and windows uses Norgren Oil-Fog Lubrication on 16" circular saws for cutting to length extruded aluminum bars and shapes. The extrusions are 2½" to 4" wide and are generally stacked 3" to 4" high for simultaneous cutting.

Saw blade life expectancy was approximately 8 hours with the previous manual lubrication system, and burrs at the cut ends were excessive. With Norgren Oil-Fog Lubrication for each saw blade, the blade life has been increased to 3 to 5 weeks. A manual operation has been eliminated. Smoother cuts are obtained, burrs practically eliminated.

The Alumatic Corporation uses Norgren lubricators exclusively for the lubrication of pneumatically operated equipment.





A ¼" Norgren lubricator is used to lubricate each saw blade. The lubricant is a specially compounded cutting oil used at the rate of 3 fluid ounces per hour per blade. A cam-actuated spring loaded valve permits continuous spray application for heavy cuts and intermittent application on light cuts.

For complete details on this Norgren Oil-Fog application, write for Norgren Blueprint No. 122, or phone the Norgren representative listed in your telephone directory, classified section under Norgren Pneumatic Products.

C. A. Norgren CO.
3421 So. Elati, Englewood, Colo.

FACTORY / LABOR RELATIONS NEWS

Begins on page 234

said: The right to direct the working force means the right to transfer workers as operations demand. Seniority was plant-wide. No employee rights were violated. Lewisburg had done the right thing. Case dismissed!

Foreman's Home Is Sacred

The lot of a foreman is not always a happy one. All day long he has to listen to employee beefs—and this particular foreman, employed by the Emerson Electric Company of St. Louis, Mo., had to hear a few at home. But fortunately an arbitrator came to the rescue and restored to him the sanctity of his home.

It all started one day when this foreman spotted a worker in the locker room a few minutes early. He reported this to the worker's own foreman. But nothing came of it. However, the next day, the worker visited the "snitcher" at home. No one knows for sure who started what. Each participant has a different version. But for sure, there were threats, belligerency, and a lot of noise. The employee was fired because he went to the foreman's home. And the arbitrator who heard the case, upheld the discharge.

It didn't matter who started the fracas, said the arbitrator. The worker had no right to go to the foreman's home. He should have resorted to the grievance procedure provided in the contract.

Unions Beat Political Tom-Tom

When the dotted lines on the union contract have been filled in, the average employer consoles himself by counting demands he didn't yield on, and to himself says: That's that until next year.

Not so with the good union leader. Contract gains are year-round matters with him. Moreover, he doesn't confine his campaign to the employer's gate. What he can't get from

1105...YES, ELEVEN-O-FIVE

is the new-strength wire in Roebling's

Royal Blue

WIRE 1105 ROPE

AS SIZES and constructions go, Royal Blue is like the ropes you have used until now... but the likeness ends there.

Royal Blue is made of Roebling's new 1105 wire, the strongest, toughest wire developed up to now for use in any wire rope.

Royal Blue Wire Rope is as enduring as the wire from which it is made.

Write us for full facts on Royal Blue Wire Rope, or contact your Roebling distributor.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 61 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

DAGE "AN EXTENSION OF HUMAN VISION"

RAILROAD'S USE OF CLOSED-CIRCUIT TV BY DAGE SPEEDS FREIGHT-CAR HANDLING

DAGE TV is in daily use at the Potomac Yard at Alexandria, Va., which serves *five* large railroads. As incoming trains move across viewing screens at a central control station, the operator completely identifies each car, quickly and safely, regardless of weather. Sorting and regrouping of trains are expedited and costly errors are avoided.

IN BUSINESS, INDUSTRY, AND EDUCATION, closed-circuit DAGE TV is proving itself every day in scores of ways. Business records are inspected and signatures verified . . . dangerous operations are viewed safely . . . inaccessible devices are easily supervised . . . training groups view special processes and operations at distant locations . . . careful security watches are kept on key points.

INEXPENSIVE TO INSTALL AND OPERATE, DAGE TV is a visual tool that pays for itself many times over. *Whatever your business* . . . find out how closed-circuit TV by DAGE can improve your operations and lower costs in many ways. For a free booklet detailing DAGE equipment and installations, write, wire or phone Dept. MM-2, DAGE TELEVISION, Michigan City, Indiana . . . Michigan City 3-3251.

DAGE TELEVISION
Division of Thompson Products, Inc.
Michigan City, Indiana

IN CANADA DISTRIBUTED BY ROGERS MAJESTIC ELECTRONICS, LIMITED, TORONTO, ONTARIO

Begins on page 234

the employer at contract negotiations time, he tries to wrest from him in the political arena. Three recent items remind us of this:

The Chamber of Commerce of the United States points out that 1955 "may well be marked as the year the unions descended on state legislatures in an attempt to put a union label on the dome of each state capital. Technique for plugging legislation favorable to labor union ranged from girl lobbyists to heavy financial contributions." For example, in Ohio the CIO had a large group of unionists at Columbus practically every day legislation was in session. Composition of the group was changed every three days —each member doing a three-day stint. Another instance of union political activity, reports the Chamber: in Missouri there are a half-dozen business agents, union officials, and union lawyers in the legislature.

Number two is a CIO book called "How to Win Votes and Influence Politicians," available now only to CIO political action leaders (but the CIO promises to circulate it more widely in 1956). Chapters range from "How to Pick your Candidates and Work With Them" to "How to Get Out the Votes on Election Day."

Final number is a plea of not guilty entered by UAW-CIO President Walter P. Reuther in the arraignment of the union in Detroit on charges that the television programs last year violated the election clause of the Taft-Hartley Act. The UAW station used money from its general funds for TV programs on which Democratic candidates appeared. Nothing wrong with this, said Reuther.

No Sauce for This Gander

As an employer you can adopt a rule denying employees the right to distribute in your plant literature that solicits union membership. At the same time you can distribute anti-union leaflets yourself. The Nation-

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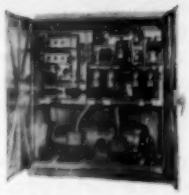

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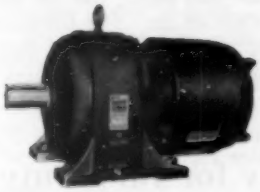

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Begins on page 234

al Labor Relations Board said that the ban on employee distribution was okay in this case—and management has the right to make rules that do not bind itself. The employer can distribute literature, said the Board, without giving the same privilege to the union, if the material given out contains no threats, no promise of benefits, no coercive statements.

Are They "Dues" or "Assessments"?

Sometimes a mere employer cannot distinguish between "assessments" and "dues." It's apt to take the fine mind of a union leader to do so. For example, when a union increased its "dues" from 75 cents to $2 per week, to the Bates Manufacturing Company, a textile company, the $1.25 difference was an assessment. To the union it was a dues increase.

The distinction made this difference. If it was dues, Bates would have to check it off under the contract. If an assessment, it wouldn't.

When the matter was put before an arbitrator, Bates argued that newspapers said the increase was to be used as a strike fund. Also, the increase was for a limited time.

The union affirmed that some of the money would be used for a strike fund, but argued that there were other purposes. It denied that the increase was for a specific period. It was to be cut out a week after the then current strikes in the textile industry.

Ruled the arbitrator: In the past, the same union put temporary increases into effect and the employer didn't object. The definitions of "dues" and "assessments" vary with custom and practice. These were dues.

Pay for Jury Duty

Jury duty for employees creates a dilemma for the fair-minded employer. He is torn between the patriotic desire to give his employees time off with pay — and the hard-

New BETTER way to insulate plant piping

gb SNAP*ON

Less than two years ago it was a time-consuming and expensive job to insulate plant piping. Not so today, thanks to a new concept in pipe insulation — G-B Snap*On, the new one-piece molded pipe insulation of fine glass fibers.

Snap*On goes on piping far quicker and easier than any other pipe covering, with less down-time or interruption of plant processes. It comes in 6' sections that can be snapped over piping in a matter of seconds. It's exceptionally light in weight, easy to apply even in tight spots. No time is wasted in clean-up, since Snap*On is clean and dustfree, won't crumble when dry or get muddy when wet.

All this adds up to quicker, easier application than you've ever experienced. So don't fail to try Snap*On the very next time you need insulation from chilled or heated piping where temperatures do not exceed 350°. You'll find there's absolutely *nothing like it for economical application, thermal efficiency and permanence.*

FOR SAMPLE AND NEW BROCHURE, *write today or call the G-B Distributor in any of 57 cities. You'll find him listed in the Yellow Pages under "Gustin-Bacon Insulations."*

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FACTORY / LABOR RELATIONS NEWS

Begins on page 234

boiled economics of running a business for profit. Review of a recent study on the subject by the Bureau of Labor Statistics may furnish some practical guidance.

Several months ago the BLS examined 1736 union contracts effective in 1953 covering some 6-million workers. Only 18% provided pay for jury service equal to the employees' regular pay. Most accomplished this by paying the employee the difference between his jury duty fee and his regular pay. A few contracts (21) gave the employee his jury duty pay in addition to his regular company pay.

Obey First– Argue Later

As a rule, employees are required to obey company rules and union members cannot expect better treatment. The only difference is that a union member can invoke the grievance procedures. A company posted a notice that coffee breaks would be cut out. Plenty of advance notice was given. Still, four employees ignored the new rule and took time out.

The company suspended them for five days. The union opposed this discipline saying that the company was taking away an important right.

Obey the rule and file a grievance, said an arbitrator. The only time when an employee can disobey a rule is when he is asked to do a hazardous job or act in a criminal manner. *(AVCO Award)*

BRIEF BUT IMPORTANT

More time for payoff. Illinois employees who quit or are fired must get paid in full within five days of termination. Law used to read three days.

Proposed Social Security Changes. If your pension plan ties in with Social Security, keep your eye on the new Social Security program now under study by the House Ways and Means Committee. This would

from the **president's** office

to the **machine shop**

KENFLEX floors cut maintenance costs

Where factory floors must be durable and colorful, KenFlex is the answer. And if you're trying to stretch plant operation dollars, KenFlex is a "must" for low maintenance costs.

That's because low upkeep, along with good looks, is built right into each KenFlex vinyl asbestos tile. KenFlex's smooth vinyl surface withstands spilled fats, oils, drugs, alcohols and foodstuffs. Quick damp mopping is all it needs.

Tough asbestos fibres give KenFlex long life under the heaviest industrial conditions. Yet KenFlex costs *less* than many floors that soon become pitted and scratched, and increasingly expensive to maintain. Get full details on KenFlex and other Kentile, Inc. Floors from the Kentile Flooring Contractor listed under "Floors" in your Classified Phone Book, or write Kentile, Inc., Brooklyn 15, N. Y.

Made by America's largest manufacturer of resilient floor tiles

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WILL THE PUMPS MATCH THE EXCELLENCE OF YOUR INSTALLATION?

The wrong pump can spoil the most perfectly planned job — the right one helps make it a lasting success! "Buffalo" Pumps like the Double Suction Type SL below (for clear water service) have earned the reputation for reliable performance over and over. The "Buffalo" Q Factor— *the built-in Quality which provides trouble-free satisfaction and long life* — goes into every "Buffalo" Pump you specify.

WHY TAKE A CHANCE? PICK "Buffalo"

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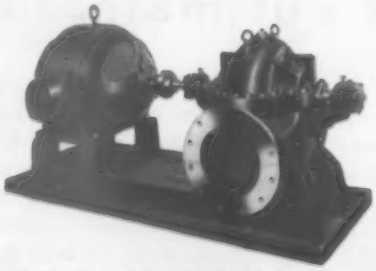
is ready with competent help in selecting the right pump for any problem you may have. Graduate Engineers, factory and field trained. In all principal cities. Call on your nearest one!



"Buffalo" PUMPS

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FACTORY / LABOR RELATIONS NEWS

Begins on page 234

lower the age at which women can get benefits from 65 to 62 or 60 years. It would also give permanently and totally disabled workers full social security benefits promptly, rather than at 65—as now required.

Unemployment pay for pensioners. Maine appears to be another state in which a court will allow a retired employee to collect *both* pension and unemployment benefits. The Supreme Judicial Court of that state just ruled this way in a case involving CIO Textile Workers. (*DuBois v. Maine*)

Survey of accident and health plans. The Bureau of Labor Statistics has just issued a survey of accident and health plans that should be of great value in comparing your plan with others in the industry throughout the country. Called "Digest of One Hundred Selected Health and Insurance Plans Under Collective Bargaining 1954," it summarizes the key features of such plans in over a dozen industries and lists the companies involved. For $1.00 the Superintendent of Documents, Washington 25, D. C., will send you a copy. Ask for BLS No. 1180.

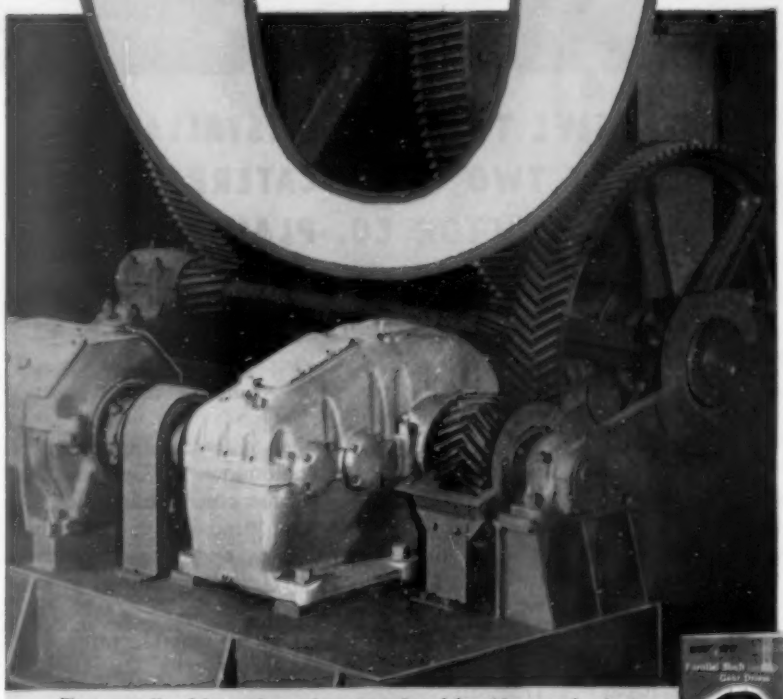
You Be the Arbitrator

Begins on page 140

THE AWARD: The union won its case. The arbitrator explained that the right to be called in under the contract was to be governed by seniority. Steve got 4 hours call-in pay for having been called in, and Joe was entitled to the same because he would have got that had his seniority not been overlooked.

CAUTION: *The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.*

6 reasons why Link-Belt Parallel Shaft Gear Drives ASSURE CONTINUOUS PRODUCTION



Ten-ton coils of hot strip steel are transferred by this up-ender in a modern mill. Link-Belt parallel shaft gear drive fitted with outboard bearing on output shaft withstands the exceptionally tough duty.

LINK-BELT'S compact, self-contained parallel shaft gear drives are designed to avoid common problems encountered in transmitting heavy shock loads. Here's how:

1. FOR DEPENDABLE OPERATION gears are precision-machined, shafts rigidly supported.
2. TO WITHSTAND HEAVY SHOCK and overhung loads, ball and roller bearings are used throughout.
3. TO PREVENT ENTRANCE OF DIRT and moisture, effective grease-lubricated seals are used on all shafts.
4. FOR SUPPLYING OIL to each rotating part at all speeds, automatic splash lubrication is used.
5. TO PREVENT REVERSE ROTATION on conveyors, elevators and similar equipment, a built-in backstop can be provided.
6. FOR EASY INSPECTION OR MAINTENANCE, all parts can be removed without disturbing base, which can be grouted in concrete.

Book 2619 gives complete details. Get a copy from your Link-Belt office or authorized stock carrying distributor. Or write direct.

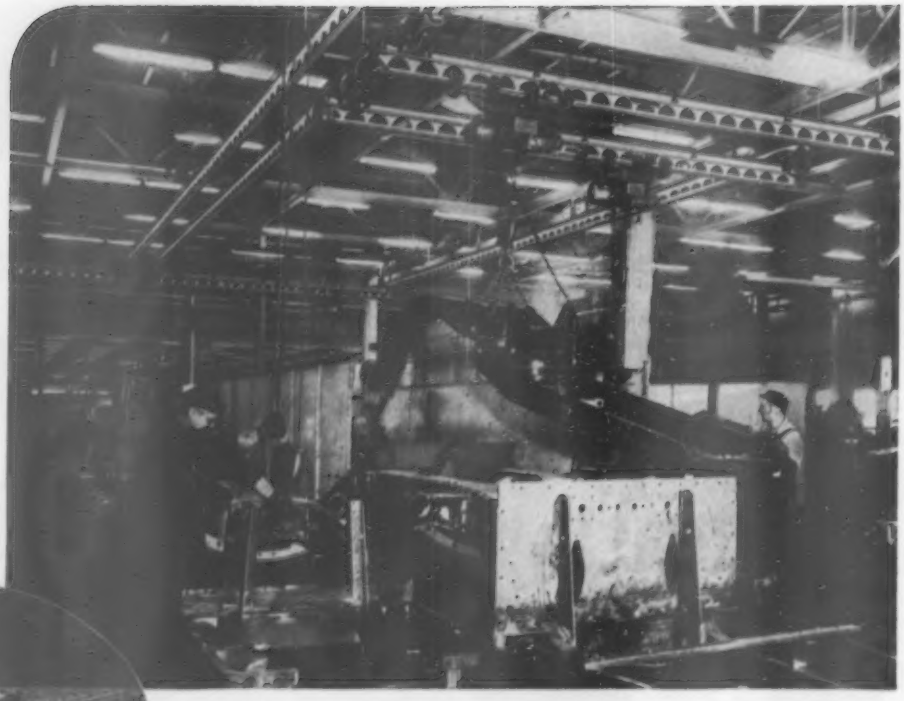
Get JOB-MATED drive combinations from the complete Link-Belt line

In addition to parallel shaft gear drives, Link-Belt builds in-line helical and worm gear drives, Gearmotors, Motogears, variable speed drives, fluid drives, chains, sprockets, couplings, bearings, etc. All are pre-engineered for easy installation and maximum efficiency.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,074



A hand-propelled interlocking crane system with two-ton electric hoists makes the handling of heavy parts easy in the Motor Grader Frame Assembly Section, Peoria, Illinois, Plant.

Caterpillar Diesel No. 12 Motor Grader in action.

EXTENSIVE TRAMRAIL INSTALLATIONS SERVE TWO GIANT CATERPILLAR TRACTOR CO. PLANTS

Peoria Plant Alone Has $1,000,000 Installation

SINCE the first small initial order for Cleveland Tramrail was placed by Caterpillar Tractor Co. over a quarter of a century ago, their installation has grown steadily until now in the vast Peoria Plant alone there is considerably more than one million dollars' worth in operation.

A large part of the job in building tractors, motor graders, diesel engines, etc., is handling materials. It is calculated that 20 tons of handling is required for each ton of tractors or diesel engines shipped from the plant. Saving a few minutes on each ton handled, amounts to a tremendous overall figure and resultant dollar savings.

Because of changes brought about by rapid plant growth, new models, or adoption of more advanced methods, for which Caterpillar is noted, it is often necessary to dismantle and re-erect Tramrail equipment. The ease with which this can be done with Cleveland Tramrail has proven to be especially advantageous to Caterpillar. Equipment serving one area can be taken down and installed in another area for use on an entirely different handling operation in very little time and usually without interfering with production.

Like Caterpillar, your plant, whether large or small, most likely can profit with Cleveland Tramrail.

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THE CLEVELAND CRANE & ENGINEERING CO.
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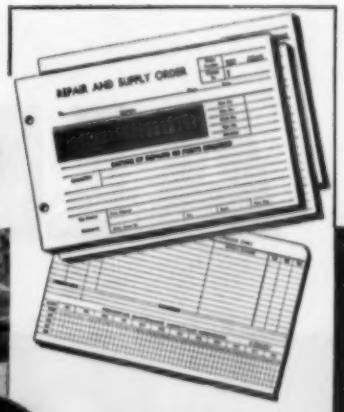
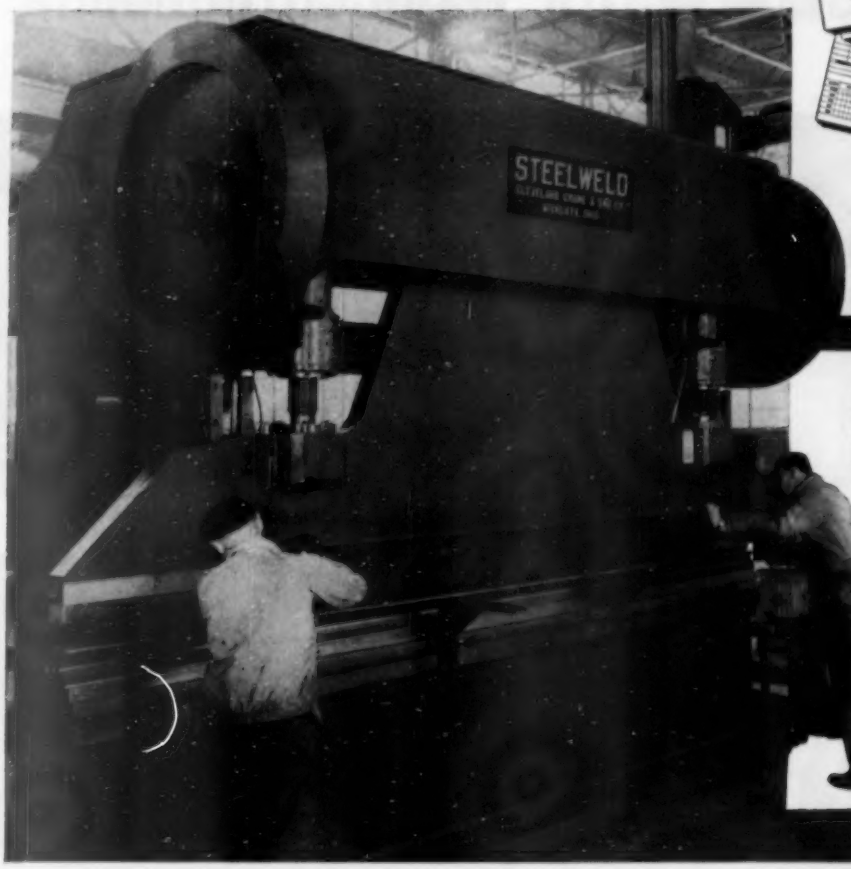
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Accurate Records Prove
LOW COST OPERATION



These forms enable the Chicago Plant to develop records which provide concrete facts on repairs and maintenance for all machines.



A Steelweld Model 14½-10 press working on various size steel plates up to 16'-0" x ¼". The ease with which the hand-cranked back gauge is adjusted is a favorable feature. The press is easily jogged in minute amounts. Shown is a 14'-0" x ¼" plate being formed for a hopper.

Link-Belt manufactures a wide variety of conveying and processing equipment such as apron, screw, oscillating and overhead chain trolley conveyors, railroad car dumpers, bucket elevators and other handling equipment.

SOME YEARS AGO the Pershing Road Plant of Link-Belt Company, Chicago, established a record system for keeping track of repairs and maintenance costs of all machine tools. This system provides a detailed history of maintenance required and lists every item of expense for every machine.

The record system proves that the maintenance cost for Steelweld machines, both bending presses and shears, is comparatively low.

Because of this, and the fact that Steelweld machines have many desirable operational features, a number of which are unavailable elsewhere, Link-Belt regards them highly. In fact, so much that 20 Steelweld Presses and Shears are now serving Link-Belt plants in nine cities.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

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BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

AIM for reduced handling

Unitized and strapped sheets of veneer being placed in storage by mechanical lift.

Bulky flue liners are handled easily when unitized into this strapped package.

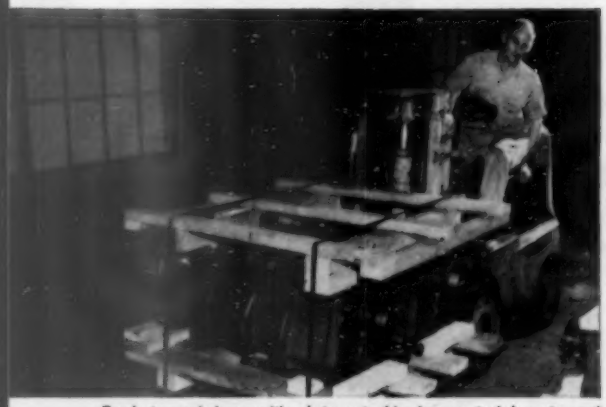
Pressed wood chip logs unitized and strapped in jig for faster handling.

Steel strapping has unitized this package of brick for removal by lift truck.

KD cleated boxes are quickly and easily strapped into units for faster and safer handling.

costs with Acme Steel Strapping

and unitizing ideas



Truck transmissions unitized to cut shipping, material costs and speed handling.

KD cartons unitized on pallet for easy handling and safe shipping.

Unitizing—the process of grouping and strapping individual packages or products into a single unit—is paying off for manufacturers in virtually every industry.

The pictures tell the story of what Acme Steel *unitizing* ideas can accomplish, as brought to industry by your *Acme Idea Man:

- . . . Faster handling
- . . . Savings in packaging materials
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Talk to your *Acme Idea Man. Let him show you how to apply Acme Steel Strapping, Strapping Tools and *ideas* to your packing, handling, storage or shipping problems. Just call the nearest Acme Steel office, or use the coupon below.

ask your *Acme Idea Man to help solve your problems

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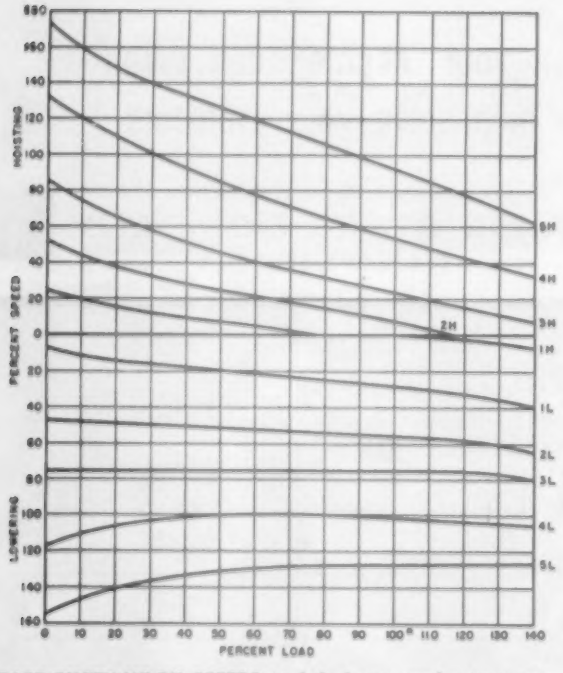
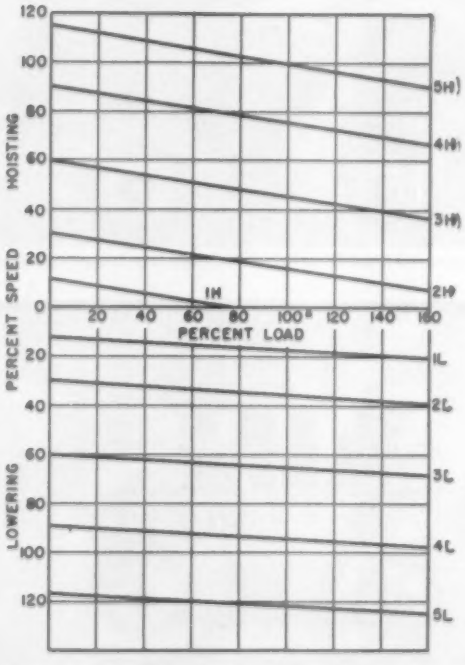
PINPOINT ACCURACY of hoist equipped with G-E Speed Variator drive helps cut cost, speed scrap handling at Northwest Steel Rolling Mills, Inc. Only routine maintenance has been required on the drive in 1½ years of rugged, tough service. Compact construction of packaged power unit, visible above cab, saves space in limited bridge area.

Easily-installed G-E hoist drive

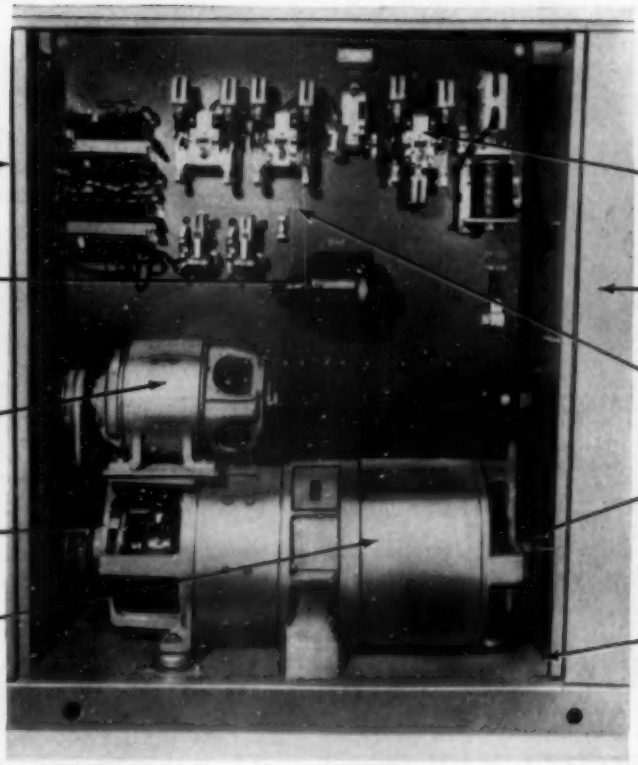


FAST EMPTY-HOOK SPEEDS to help boost yard output can be obtained by using a compound wound hoist motor with the basic G-E Speed Variator.



RELATIVELY FLAT LOWERING CURVES through use of shunt wound motor make G-E Speed Variator ideal for jobs requiring accurate positioning for wide range loads.

*100% load corresponds to rated motor current hoisting.



1. **Compact,** "packaged" power unit permits versatile mounting on crane equipment, requires fewer conductor leads.

2. **Smooth,** fast response to operator's control is provided by damping motor which prevents shock to cables and gears.

3. **Double belted,** oversized exciter provides ample excitation power for generator field, drive motor field, d-c control, and magnetic brake.

4. **Large openings** in end shield permit easy inspection of brushes and commutator.

5. **Powerful,** dependable motor generator set meets rugged duty cycle of crane and hoist equipment.

6. **Designed** for easy maintenance, most components are mounted on front of panel.

7. **All a-c components** protected in separate end compartment.

8. **All devices** identified for quick recognition, easy servicing.

9. **Pressurizing fan** and air filter system help keep unit free from dirt and dust. Filters easily replaced.

10. **For easy access,** pull-out pins on cabinet door hinges allow door removal without full swing out. Lift-off type doors are also available.

10 ADVANTAGES BUILT INTO THE G-E SPEED VARIATOR POWER UNIT FOR HOIST DRIVE APPLICATION

gives high-speed crane operation

Speed Variator drive offers faster, smoother performance, reduced maintenance

General Electric's Speed Variator hoist drive has been designed with the performance characteristics needed to provide fast, efficient movement of materials in your operation.

CONSTANT LOAD SPEEDS, relatively unaffected by load weight, enable the crane operator to pinpoint even the heaviest loads. By offering quick, smooth response, and fast empty-hook speed, the G-E hoist drive assures safer, faster, smoother crane operation.

FOR EASY, VERSATILE INSTALLATION, the Speed Variator unit is completely engineered, wired and tested at the G-E factory. When compact power system is mounted on crane bridge, there are no large resistor banks to install, fewer collector leads are required, and installation time and expense are greatly reduced. In addition, the Speed Variator unit requires minimum space in limited bridge area.

ONLY ROUTINE MAINTENANCE CHECKS have been required in 1½ years service on G-E hoist drive installed at Northwest Steel Rolling Mills, Inc., Seattle, Washington (photo above, left). Smooth acceleration and deceleration of drive eliminate load shock and prolong life of cables and gears. Long brake life is also assured because load speed is decreased electrically before brake sets. Pressurized Speed Variator cabinet has large front and rear doors for easy inspection, and air filters protect power unit from dust and dirt. The many advantages of the G-E hoist drive add up to efficient, low-cost materials handling.

FOR MORE INFORMATION, contact your nearest General Electric Apparatus Sales Office. A specialist will give you the complete story on the G-E hoist drive—the drive that is factory tested, co-ordinated, and adjusted for optimum crane performance. 815-9

DIRECT CURRENT MOTOR AND GENERATOR DEPARTMENT, GENERAL ELECTRIC COMPANY, ERIE, PENNSYLVANIA.

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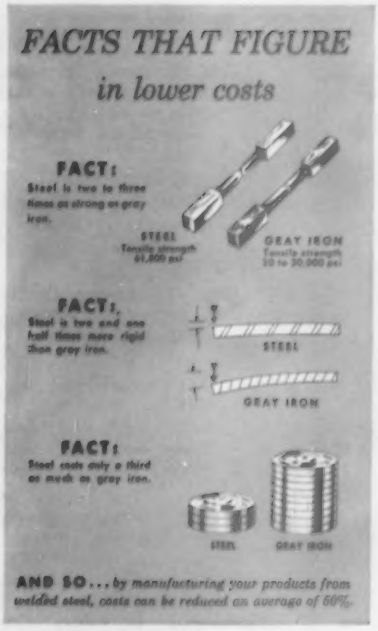
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Steel is two to three times as strong as gray iron.
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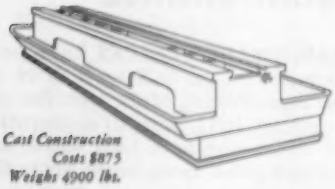
GRAY IRON
FACT:
Steel is two and one half times more rigid than gray iron.
STEEL
GRAY IRON
FACT:
Steel costs only a third as much as gray iron.
STEEL
GRAY IRON
AND SO... by manufacturing your products from welded steel, costs can be reduced an average of 60%.

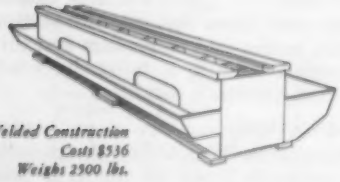
HOW PROPER DESIGN CAN LOWER COSTS

• When you design properly for steel construction, your products will always cost less to manufacture. Because steel is two to three times stronger than cast iron, and 2½ times as rigid, fewer pounds of metal are needed. Also, each pound of material costs a third as much.

Here, for example, is a base for a machine tool. As a casting it would cost $875 to build, weigh 4900 lbs. By proper design in steel, it costs only $536. Although it weighs 2400 pounds less, the steel design is actually 45% more rigid to hold important alignment of the bed ways.



Cast Construction
Costs $875
Weighs 4900 lbs.



Welded Construction
Costs $536
Weighs 2500 lbs.

GET DESIGN HELP. Latest ideas on designing machinery for steel are in Lincoln Procedure Handbook on Arc Welded Design Practice. Write.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

FACTORY | EXECUTIVE HEALTH

By REX H. WILSON, M.D., Medical Director
The B. F. Goodrich Company, Akron

Watch Those Varicose Veins!

Untreated — at best they're a nuisance, at worst always dangerous. So don't neglect your doctor here.

THAT'S WHAT this plant engineer has suffered from for many years—fleeting attacks of painful, infected varicose veins. Each attack begins with tenderness about one of his swollen veins. The vein dilates and becomes hard, and the area about it is red and swollen. His condition is known as phlebitis.

Only successful treatment for him is to go to bed, elevate the affected leg, and put warm moist cloths about the area. Rest and heat, plus antibiotics, usually relieve the condition in several days. Between times he wears elastic stockings to keep the veins from dilating. But some day he will have to have the varicose veins removed. His is a typical case history.

Enlarged, dilated, tortuous veins called varicose veins are common. They can occur anywhere in the body, but are usually found on the back of the legs and about the ankles.

Arterial blood vessels are the supply system for the tissues and organs of the body. The blood they carry contains the ingredients necessary to make the body live and function. *Venous blood vessels* return the used blood along with waste products from the tissues, back to the heart and lungs for purification and rejuvenation. The bright red arterial blood flows under considerable pressure and force. This slow-moving stream of blood can stagnate easily and form clots and obstructions. When an obstruction occurs, the veins below it dilate. Result: varicose veins.

How they form — They can be caused by hereditary weakness of the walls of the veins. If your ancestors had varicose veins, you probably will, too. And infection of the vein — or injury to it — can bring about vein enlargements. Also obesity, malnutrition, and abdominal tumors can, by pressure on pelvic veins, cause obstruction and dilation of leg veins.

After the varicosed condition has started, it may be aggravated by excessive use of the legs. As the veins lose their elastic tone and become tube-like, they are easily infected (phlebitis). As the brook-flow slows, clots form — which also create a tendency to infection. Thrombophlebitis is the result.

If you have phlebitis, your small varicose veins will not cause the symptoms. It's the large, snakelike, winding veins that cause pain, aching, and itching. Your legs tire and

New two-stage Ro-Flo compressor provides constant efficiency... cuts maintenance

Efficiency and air supply are constant year after year with *Ro-Flo* compressors. Even if wear occurs, it automatically compensates for itself so that air supply is unaffected.

In addition, rotary design eliminates practically all vibration. No heavy foundations are needed.

Maintenance is cut too! There is no wear and tear from shock and vibration . . . no hard-to-maintain pistons and valves.

For constant efficiency . . . overall savings on air, modernize plant air supply with two-stage *Ro-Flo* compressors.

GET THE FACTS: Contact your A-C office or write Allis-Chalmers, Milwaukee 1, Wis.

Two-stage *Ro-Flo* compressors in pressures from 60 to 125 pounds gauge, and volumes from 250 to 1800 cubic feet per minute.

Ro-Flo is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

A-4714

ALLIS-CHALMERS

T-J RIVITOR . . .

8″ throat . . . feeds and sets rivets with special 10 station indexing fixture. Has air operated hold down mechanism and special air circuit to provide automatic indexing.

T-J CLINCHOR . . .

one of six special 8″ throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets square cased nuts in outside quarter panels, left and right hand.

AUTOMATIC FEEDING and SETTING

More and more . . . T-J Rivitors and Clinchors meet today's demands for faster assembly on a wide range of jobs . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8″ to 36″.

T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to ⅞″ long. Air-powered sets aluminum alloy rivets or steel rivets up to ¾″ long. Throat depths 8″ to 36″.

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON
RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

38 YEARS EXPERIENCE

FACTORY / EXECUTIVE HEALTH
Begins on page 252

cramp easily. Fluid may accumulate about your lower legs and ankles. Pain is usually less on walking and more on standing. Decreased circulation causes a darkening and irritation of the skin around the varicosity.

Industrial hazards—A slight blow over a large varicose vein can cause an ulcer to occur. This ulceration, sometimes referred to as a "rodent ulcer," is slow healing because of faulty circulation. Injury to a leg that has varicose veins can cause clots to form in the veins. Occasionally these clots break loose and travel as emboli in the blood stream to other organs of the body. If they lodge in the blood vessel of an important organ they can, by obstructing the vessel, cause serious and sometimes fatal results.

For example, not long ago a middle-aged worker suffered a severe break of his left upper leg. He had large varicose veins of that leg. On the third day after injury he began to have severe pain in the chest. A clot, which had formed in the varicose vein, had broken loose and lodged in the coronary blood vessel of the heart. This obstruction caused heart muscle failure. He died several days later.

How to treat them — Your varicose veins can be successfully treated in a variety of ways. They can be tied off and chemicals can be injected to close them. Some veins can be entirely stripped out. In both instances the blood will be carried by other veins in the leg. You can wear elastic stockings (made to look like nylons for the ladies). They will keep the veins from dilating and, by maintaining the speed of the blood flow, reduce swelling of the feet and ankles. When clots occur they can be dissolved by anti-coagulant medication.

Varicose veins are a nuisance. They can be dangerous. In this day of wearing shorts and bringing the legs to public view by both sexes they mar the attractiveness of the leg — which is a source of mental anguish to some! If you acquire varicose veins, see your physician. He can help you.

Why settle for 50 years when you could have 100?

FACTS ABOUT Exide®

IRONCLAD® INDUSTRIAL TRUCK BATTERIES

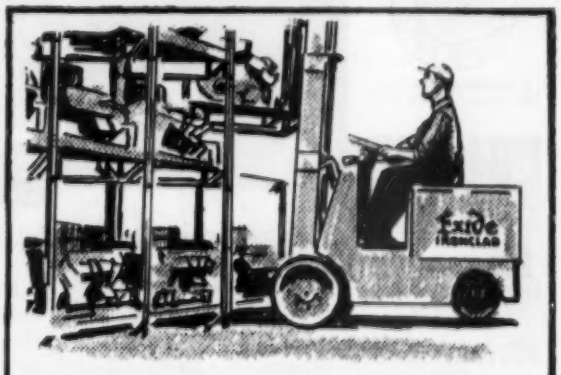
MOVE TEN TONS FOR A PENNY!

...WITH DEPENDABLE EXIDE-IRONCLAD POWER

THIRTY-SEVEN CENTS A DAY BUYS THE POWER TO KEEP AN ELECTRIC TRUCK ON THE JOB ALL SHIFT LONG—MOVING 340 TONS! COMPARE THIS LOW OPERATING COST WITH THAT FOR ANY OTHER TYPE OF POWER. EXIDE-IRONCLADS GIVE YOU A LOW DEPRECIATION COST BECAUSE OF THEIR UNUSUALLY LONG LIFE; MAINTENANCE COSTS ARE ALSO LOW. ADD UP THESE LOW COSTS, AND GET EXIDE-IRONCLADS FOR YOUR BEST POWER BUY—*AT ANY PRICE!*

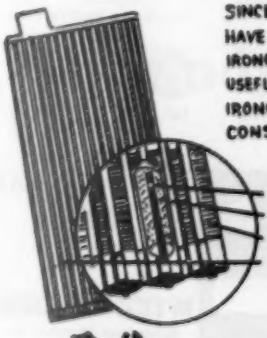
WORKED TO DEATH TO LEARN SECRETS OF *LONGER LIFE!*

LAB TESTS OF IRONCLADS AGAINST CONVENTIONAL TYPES OF BATTERIES SHOW THAT IRONCLADS GIVE BETTER PERFORMANCE...AND FROM 20 TO 30% LONGER LIFE! THESE TWO FACTS, DEMONSTRATED ALSO BY THOUSANDS OF EXIDE INDUSTRIAL BATTERY USERS, ARE REASONS WHY EXIDE-IRONCLADS ARE YOUR BEST POWER BUY—*AT ANY PRICE!*



END WORK-SCHEDULING WORRIES... *IRONCLADS STAY STRONG* TO SHIFT'S END!

POWERFUL IRONCLADS HELP YOU KEEP PRODUCTION MOVING WITH UNIFORM RATE OF MATERIALS HANDLING! THEY KEEP TRUCKS WORKING FULL-SHIFT, WITH NO LAST-HOUR LET-DOWN IN TRUCK POWER OR PERFORMANCE...YOU MAKE FULL USE OF EVERY MAN AND MACHINE, GET MORE WORK DONE!



SINCE 1910, EXIDE RESEARCHERS HAVE GREATLY IMPROVED EXIDE-IRONCLAD PERFORMANCE AND USEFUL WORKING LIFE, BUT THE BASIC IRONCLAD PRINCIPLE OF TUBULAR CONSTRUCTION REMAINS THE SAME.

LET EXIDE HELP SOLVE YOUR INDUSTRIAL TRUCK BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 1982, A MANUAL ON INSTALLING AND MAINTAINING MOTIVE POWER BATTERIES.

Exide INDUSTRIAL DIVISION. The Electric Storage Battery Company, Philadelphia 2, Pa.

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BLISS
E. W. Bliss Company
BOOTH #1414

BRYANT
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Clearing Machine Corp.
BOOTH #716

CLEVELAND
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Consolidated Machine Tool Co. — BOOTH #217

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Famco Machine Company
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FEDERAL PRESS
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BOOTH #1402

FOX
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Greaves Machine Tool Co.
BOOTH #721

speeds installation of any machinery protects accuracy of precision machines

These machine tool builders cut set-up time at the Machine Tool Show from hours to minutes with BARRYMOUNT® Leveling Isolators. No drilling floors, no setting lag bolts, no shimming — they just set their machines on the Barry mounts, adjusted the leveling screws, and the normally tedious, costly job was done.

This is not just a show trick — it's a standard efficiency procedure for new installations and re-installations in large and small plants all over the country. And, *at the show or in your plant*, the isolation built into Barry mounts protects precision machines against vibration from nearby heavy equipment.

At the National Metal Exposition in Philadelphia, you will find Barry engineers at Booth 2062, ready to show you how you can simplify installation, protect machine accuracy, prolong machine life, and cut maintenance costs with Barry Machine Mounts.

BARRY CONTROLS
INCORPORATED
736 PLEASANT STREET WATERTOWN 72, MASS.
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

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Glass containers for every purpose are designed and manufactured by Owens-Illinois Glass Company—over 100 billion units made in last 25 years

More than 3,000 new designs per year
—without a "bottleneck" in drafting

In the Design Development Department of the Owens-Illinois Glass Company, Toledo, Ohio, no time is lost in tedious redrafting. A simple short cut involving the use of Kodagraph Autopositive Paper and Kodalith Film *gives customers fast service . . . saves dollars every day.* Chances are you can adapt this technique to your own routines.

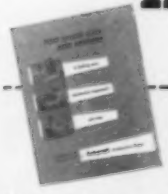
Big head start. Kodalith Film prints of elements which are repeated from time to time are kept on file. When a new design calls for any of these elements, the draftsman merely tapes the right films on clear acetate *and orders an Autopositive.* No redrafting!

A positive photographic intermediate is produced *directly* by exposing the "paste-up" in contact with Kodagraph Autopositive Paper, then processing the print in standard photographic solutions. No negative step . . . *easy room light operation.*

New design is added to the Autopositive, which has dense photographic black lines on a clean white translucent base. Required number of shop prints—each crisp and uniform—are produced from this master, which can also be used later on for minor revisions.

Kodagraph Autopositive Paper

"THE BIG NEW PLUS" in engineering drawing reproduction



Shows all the ways you can save with Kodagraph Autopositive Paper.

MAIL COUPON FOR FREE BOOKLET

EASTMAN KODAK COMPANY
Industrial Photographic Division, Rochester 4, N. Y.

17

Gentlemen: Please send me a copy of "New Short Cuts and Savings."

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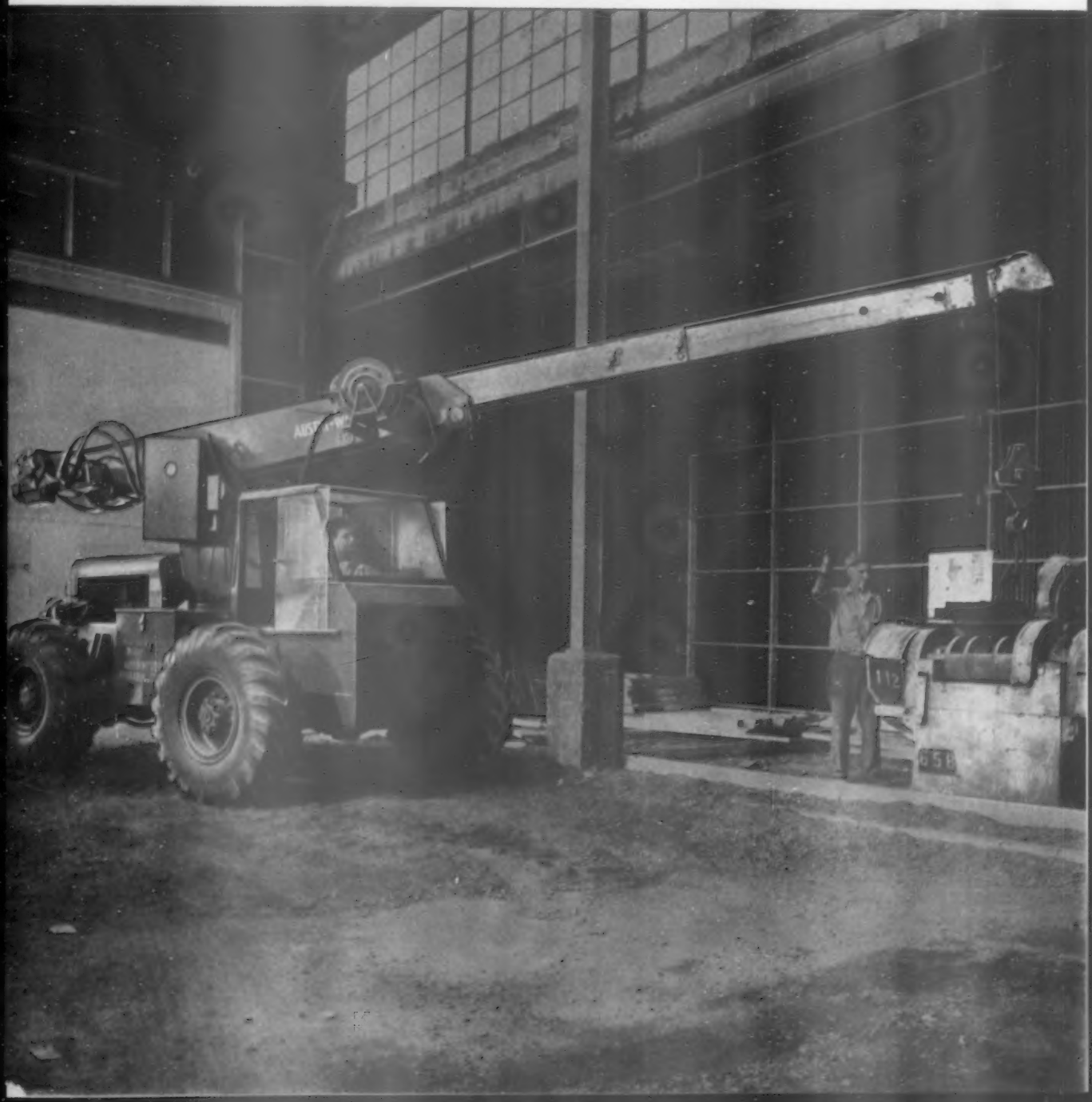
Kodak

AUSTIN-WESTERN HYDRAULIC CRANE

Most Versatile Tool



at Columbia Steel

Useful Inside and Outside...Lifts, Carries, and Spots Any Material Anywhere

Says Robert W. Williamson, Plant Engineer

Columbia Steel & Shafting Co., Carnegie, Pa.

"This hydraulic unit—has met every requirement we have made of it."

"Besides that, the over-all savings is impressive."

"Our Hydraulic Crane has proved to be so powerful, speedy and maneuverable that it has replaced a smaller mobile crane and its operator, as well as a crawler tractor requiring another operator."

"We save the difference in the cost between owning and operating one versatile tool in place of two less useful ones."

RETURNS 100% A YEAR ON INVESTMENT

"... We figure our A-W unit directly saves us 100% a year on our investment—plus helping to reduce maintenance cost and downtime."

HANDLES NUMEROUS JOBS

"This hydraulic unit frequently supplements the Shipping Department's facilities and loads box cars and trucks with finished steel."

"When an overhead crane is down for repairs, our Austin-Western unit unloads four-foot diameter coils of wire and arranges them in racks in the warehouse."

"When trucks happen to be immobile with tire and battery trouble, we pull them in or assist in quick tire change."

"When our 45-ton diesel is tied up elsewhere, we even pull loaded gondola and box cars on our switch tracks."

"The crane takes all kinds of conditions in stride."

"... have really required no repairs in 10 months of pretty grueling service."

AUSTIN-WESTERN COMPANY

Construction Equipment Division · Baldwin-Lima-Hamilton Corporation

AURORA, ILLINOIS, U.S.A.

Power Graders • Motor Sweepers

Road Rollers • Hydraulic Cranes

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605 Farnsworth Avenue, Aurora, Illinois
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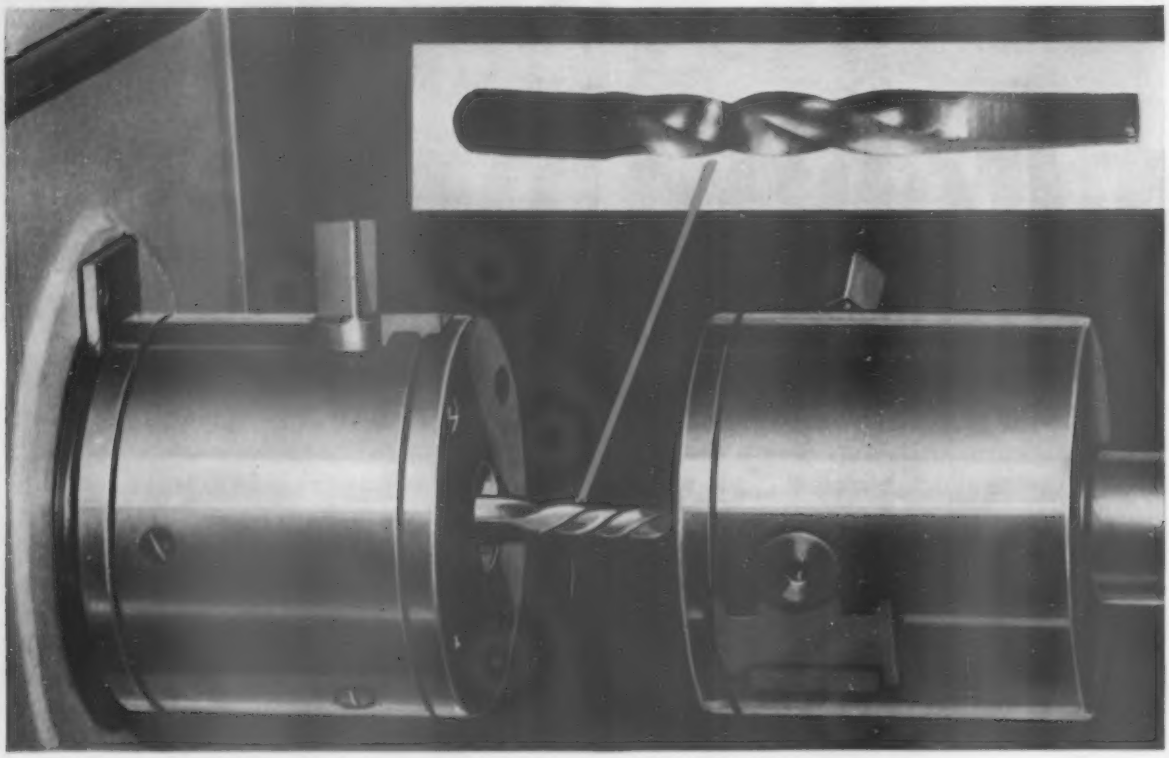
IN POWDER METALLURGY . . . IT'S AMPLEX



New STEEL OILITE'S unusual ductility is demonstrated in this photo of a typical torsion test. This revolutionary material was developed by Chrysler for applications requiring extreme ruggedness.

NEW Ductile STEEL OILITE® Opens Up New Uses for Powder Metals

STEEL OILITE is a new and revolutionary Chrysler developed die-pressed powder metal with ductility and strength in the range of low carbon steel (elongation values up to 15%; tensile strength from 35,000 to 120,000 PSI).

Makes considerable savings possible for countless new applications; one customer reported savings of 96%. Eliminates most machining operations.

STEEL OILITE may be hardened, machined and staked using conventional methods. Developed by Chrysler-Amplex engineers, STEEL OILITE has been production and field tested for over 18 months.

The engineering facilities of Amplex and Chrysler are unmatched in the powder metal industry. They are ready to help you. Call or write today for STEEL OILITE information. Ask for Bulletin STM-54.

CHRYSLER AMPLEX PRODUCTS

OILITE Bearings
Permanent Metal Filters
Finished Machine Parts
Friction Units

Write today for new STEEL OILITE Bulletin STM-54. It's yours for the asking.

OILITE — *Only Chrysler makes OILITE*

CHRYSLER CORPORATION • AMPLEX DIVISION
Dept. L-10
Detroit 31, Michigan

NEW H-5

1/2-YD., 9-TON

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

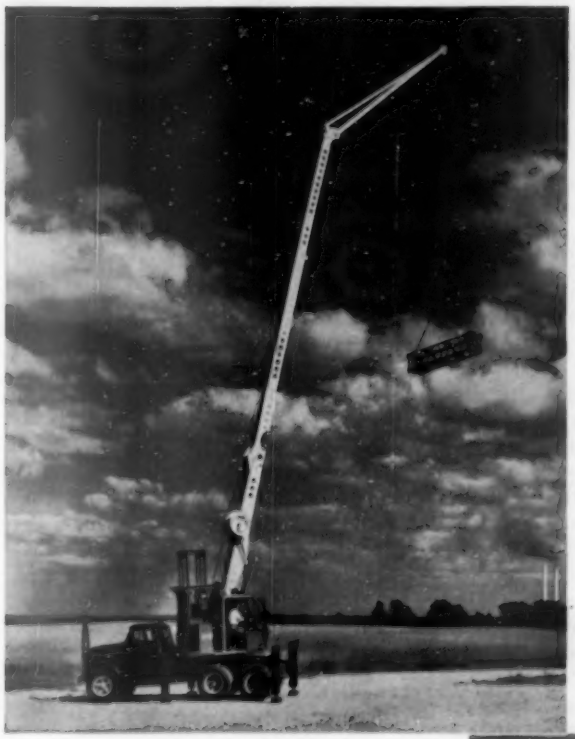
Gentlemen:
Send me your new H-5 Bulletin. This crane interests me for _____ work.
(type of job)

Name_____
Company_____
Title_____
Address_____
City_____ State_____

91H55

Hydrocrane Mounts on Conventional Truck

Completely new from outrigger feet to boom tip, this powerful 9-ton, ½-yd. Hydrocrane brings you work ability of heavy carrier-mounted cranes at small crane cost. Patented hydraulic outriggers permit mounting crane-excavator on a commercial motor truck, new or used, without sacrificing any basic crane working capacity.



Check these outstanding advantages—

Unmatched precision control of loads.

High-lift, three-piece boom (extra equipment at added cost) gives you 50 feet of reach, retracts hydraulically to 25 feet for travel. Boom and hydraulic fittings can be connected and machine working in less than ten minutes after arrival at job site.

12-ft. telescoping boom action—from 24 feet to 36 feet for standard two-piece boom, from 38 feet to 50 feet for high-lift boom, plus 20-ft. jib extension.

50-mph top highway speed.

Every work function fully hydraulic.

Up to 240-fpm line speed.

Available with clamshell, crane hook, magnet.

Optional remote truck control from crane cab.

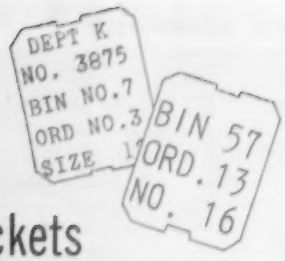
Meets highway laws for over-all length and axle loads (depending on truck selection).

See it in action

Find out what the new H-5 Hydrocrane can do for you. Ask your Bucyrus-Erie distributor for a demonstration.

BUCYRUS-ERIE COMPANY
1880 South Milwaukee, Wisconsin **1955**
75 Years of Service to Men Who Shape the Earth

New truck, inexpensive used truck, a truck you now own—the new H-5 Hydrocrane can be mounted on any standard commercial truck you choose.



Tickets that stay with the job

speed production... simplify records

Monarch in-plant ticketing systems faithfully carry identification and inspection data right with the job. Legible codes and instructions mechanically printed right in the plant can expedite rush jobs, smooth out piece-work record troubles and handle the special marking problems peculiar to your business.

Monarch mass production marking is speedy, economical, practical. Illustrated folders and sample tickets are yours for the asking—without obligation. Write us about your in-plant ticketing needs and let us submit suggestions for your approval.

The MONARCH MARKING SYSTEM COMPANY
216 South Torrence St., Dayton 3, Ohio

FACTORY / CATALOG NEWS *Begins on page 156*

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

high nickel alloys, special-purpose alloy steels, super alloy steels, tubing and pipe, fine wire specialties. *Carpenter Steel Co.*

18—Metal Finishing Chemicals. Describes 20 series of products for blackening metals; stripping plated coating, lacquers, enamels; removing buffing compounds; treating aluminum; removing rust; protecting iron and steel; etc. 24-page pocket-size foldout. *Enthone, Inc.*

19—Tool Steels. 44-page booklet is written for the non-metallurgist. Discusses properties and recommends applications of six basic classifications of steels. Includes section on heat treatment. Gives tables of engineering information. *Crucible Steel Co. of America.*

20—Industrial Fibers. Four types of redwood fibers are presented in Bulletin F-69-2. Suggests uses for filtering, insulation, reinforcing molded products, bulk filling, etc. Charts physical and chemical properties. Actual and magnified photos. *Pacific Lumber Co.*

21—Stainless Steel Wire, Rod, Strip. 40-pager covers properties, specifications, applications, design of 20 grades. Deals with corrosion-resistance, heat-resistance, mechanical and spring properties. Workability, cleaning and passivating, machining; other techniques and practices covered. *H. K. Porter Co.*

22—Stainless Tubing Steels. Data folder discusses their characteristics and fabrication. Tables of analyses, mechanical properties, creep strength, physical properties, oxidation resistance of nine stainless tubing steels. 6 pages. Catalog TB-355. *Tubular Products Div., Babcock & Wilcox Co.*

ELECTRICAL

23—Package Drives. Speed controls (5-200 hp.) for machine tools and other applications requiring accurately variable speed over a wide range are described in 8-page Bulletin 51B8166. Shows sample arrangement of typical drive components. *Allis-Chalmers Manufacturing Co.*

24—Aluminum Bus Bar. Use in both feeder and plug-in or trolley distribution systems is described in this 8-pager. Lists advantages. Details construction features, operating characteristics, and specifications. Illustrated in color. GEA-6169. *General Electric Co.*

25—Enclosed Switches. 90 types are covered in Catalog 83. Includes general purpose, sealed, heavy-duty limit, hand-operated, and maintained contact switches. Data on actuator designs, contact arrangement, electrical ratings. 28 pages. *Micro Switch.*

26—Motors. Bulletin 800 shows open drip-proof or splash-proof and totally enclosed fan-cooled models —all made to NEMA specs. Describes construction features, electrical specifications. Tables of sizes, ratings. Mounting diagrams. 8 pages. *Brook Motor Corp.*

INSTRUMENTS AND CONTROLS

27—Temperature Instruments. Line of filled thermal systems for indicating, recording, controlling, transmitting, compensating, programming –400 to 1000 deg. F. is presented in 24-page Catalog 12-A-10. New vapor pressure filled systems included. *Fischer & Porter Co.*

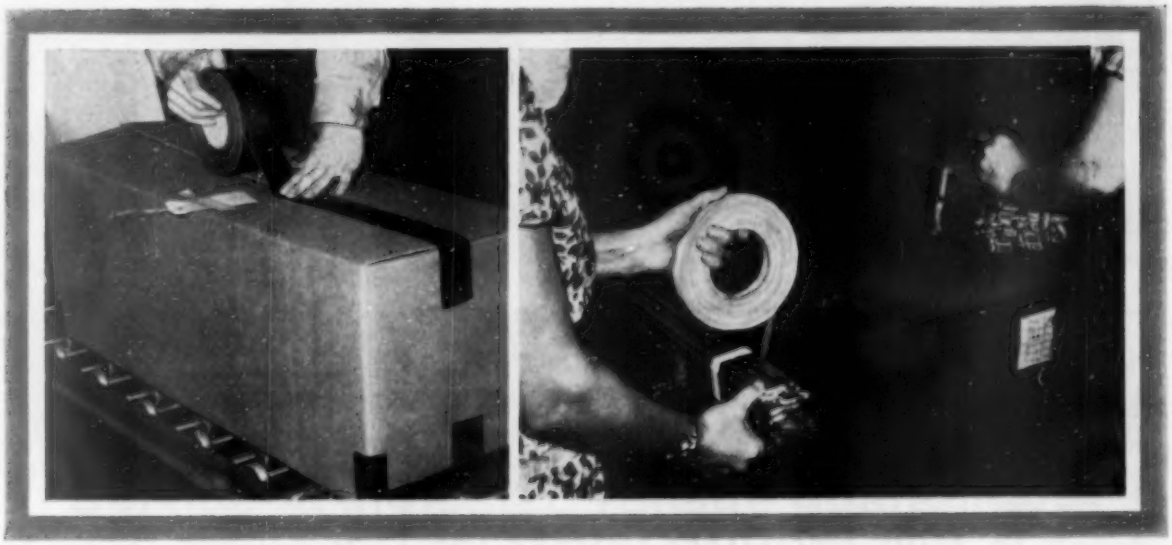
28—Precision Measurement. 258 pages of technical and engineering information on problems and solutions. New information, such as equations for wire measurement of screw threads, including those of unknown profile, is given. New products also covered. Catalog 36. *Van Keuren Co.*

29—Dial Indicators, Gages, Instruments. Included in 80-page Bulletin 416 are dial comparators and bench gages; depth gages; hand and pocket

Polyken TAPES

CONTROLLED STRENGTH

Do double duty at no extra cost



The container in the picture above holds an aircraft heater which is shipped in two cartons—one inside the other.

Formerly one kind of tape was used to seal the inner carton, another for the outer. Sometimes the two tapes were switched—an expensive error.

Durable *Polyken* Waterproof Tape now does *both jobs—at no extra cost.* In fact, packaging costs are reduced, since the cartons are sealed more securely and there's no chance of using the wrong tape.

Polyken Tape also does an extra job in the right-hand picture. The operator in front is using it to bundle aluminum door rails. The other operator is marking the tape for identification. *Polyken* Tape was chosen here for both jobs because it's economical, easy to handle, comes off clean—and saves the time and cost of tags.

The tape requirements for these jobs are not the same. Neither are the conditions under which they are used. To meet the requirements for specific jobs, *Polyken* Tapes have *controlled strength*—the proper combination of adhesive and backing. You get the *controlled strength* needed for your job. It's done right and it's done without waste.

Send coupon for full details.

Polyken®

INDUSTRIAL TAPES

Polyken Products Department of The Kendall Company

Polyken, Dept. FM-J
222 West Adams St., Chicago 6, Illinois

Please send me physical properties and further information on *Polyken* Controlled Strength Tapes.

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Company_____

Street Address_____

City_____ Zone State_____

Engineered
FOR LASTING SERVICE
. . . Whether it's a cafeteria cooler, a model with stainless steel or vitreous china top, or a type for remote installation, you can be sure of outstanding performance if it's Halsey Taylor.
Built with engineering precision, every Halsey Taylor provides the utmost in sanitation and convenience.
HALSEY TAYLOR
Send for latest catalog or see SWEET'S
THE HALSEY W. TAYLOR CO., WARREN, OHIO

YOUR EMPLOYEES DESERVE THE BEST PROTECTION
No one wants accidents, but they do occur. That is the time when a Lumber Mutual Workmen's Compensation policy becomes a blessing. The manner in which injured employees are treated and the prompt payment of compensation claims are vitally important to your business. Together they can build or destroy amicable employer-employee relations.
It will be worth your while to consult us.
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BRANCH OFFICES IN PRINCIPAL CITIES

FACTORY / CATALOG NEWS
Begins on page 156

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gages; sheet, cylinder, out-of-roundness gages; vibrometers, and many more—140 models in all. *L. S. Starrett Co.*

30—Valve Regulators. Bulletin No. 1094 considers 16 special control problems. Presents solutions with a full-page cross-section schematic drawing of installation—9 low-pressure regulator arrangements, 7 high-pressure. 36 pages. *Rockwell Mfg. Co.*

31 — Gage Service. Pocket-size booklet discusses purpose, equipment, and items laboratory will measure; procedure for using facilities. Shows typical certificate of inspection. Includes master gage block data. 16 pages. *Midwest Gage Laboratory.*

PLANT ENGINEERING

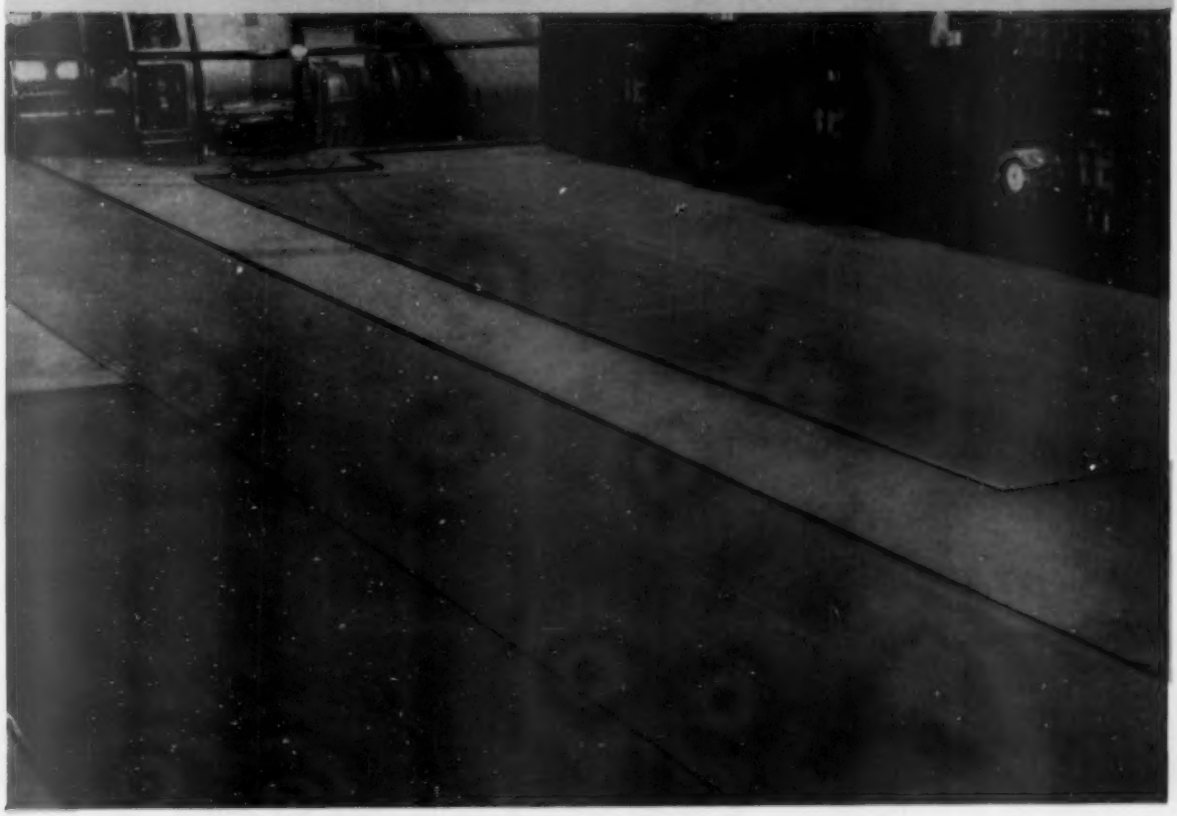
32—Pollution Control. "Protection from Smog" tells what smog is, what has been learned, what can be done about it. Recommends good air distribution, dust filtration, air recovery. Describes equipment for air recovery. 8 pages. *Connor Engineering Corp.*

33—Precipitators. Bulletin No. 2204C covers applications, principles of operation, design features, advantages, recommendations, and specifications of units for treating water, re-using and conserving it. Many photos, drawings, tables. 20 pages. *Permutit Co.*

34—Packaged Steam Generators. Capacities, dimensions, construction features, instrumentation, accessories for sizes 10,000-46,000 lb. steam per hr. Chart for selection of firing equipment and controls. Sectional drawings, photos. 16 pages. *Foster Wheeler Corp.*

35—Air Filters and Lubricators. Comprehensive listing of many sizes and types. Facts and figures on savings possible. Discusses changes in principles of air filtration; installa-

Insulate electrical apparatus with U. S. Switchboard Matting



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U. S. E-9838 Switchboard Matting has been electrically tested in accordance with A.S.T.M. Spec. (D178-24), spot-tested for 40,000 volts dielectrical strength or better, proof-tested at 15,000 volts over the entire area and recommended for use up to 3,000 working voltage.

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tion, maintenance. Dimensions, parts list. 20 pages. *Master Pneumatic, Inc.*

36—Waste Treatment. Processes for treating highly toxic cyanides and chromium compounds in wastes are subject of 16-page Bulletin 90-242-10. Covers instrumentation for controlling them. Discusses batch, continuous, integrated systems. *Fischer & Porter Co.*

37—Air Pollution. Control through use of activated carbon is explored in technical bulletin E-21. Describes various contaminants; lists 10 types of treatment. Explains "Adsorbite" system, listing 62 categories in which it has solved problems. *Barnebey-Cheney Co.*

38—Emergency Lighting. This 8-pager presents models for permanent connection, auxiliary use, and a transparent plastic-cased battery. Contains diagrams, charts, and specifications useful in planning emergency installations. Form 5736. *Electric Storage Battery Co.*

PRODUCTION

39—Power Tools, "Make Up Your Own Mind" fact booklet, shows how inexpensive, highly accurate, portable power tools are being used to supplement or replace heavy, costly machine tools. Case histories. Well illustrated. Complete story on Delta tools. 8 pages. *Delta Power Tool Div., Rockwell Mfg. Co.*

40—Precision Honing. Booklet explains honing, compares with other methods, tells where and how to use profitably. Describes and illustrates 11 features of a universal machine; explains operation; lists specs; shows typical parts for honing. *Sunnen Products Co.*

41 — Paint-Spraying Equipment. Catalog lists line of spray guns, compressors, accessories, and safety devices. Thumb index facilitates location of desired equipment. Describes

What this change did...

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"Owens-Illinois Glass Block* cut absenteeism because of colds 90%, reduced heating costs 40%, improved building appearance"

Here's what Mr. N. L. Schmid, president of The Woolson Spice Company, says about this installation: "In the Fall of 1952 our company replaced worn-out and unsightly window sash in our principal building with panels of Owens-Illinois Glass Block. The transition from the old to the new was without inconvenience; and, as a result of this remodeling, a careful check has shown that through eliminating drafts, *our absenteeism, because of colds, has been reduced ninety per cent.* Complaints from the stenographical unit ceased as to improper light. Economically, a very substantial saving has resulted in the reduction of the expense for heat. It is estimated by our General Superintendent that the *heat expense* item in our overhead has been *reduced forty per cent.* In addition to our satisfaction as to benefits from Owens-Illinois Glass Block, there also comes the pride in the *improved appearance of our building* that was so quickly changed from old-fashioned to a modern appearing structure."

BEFORE
Owens-Illinois Glass Block

N. L. SCHMID
President, Woolson Spice Company

If you are in the process of remodeling old structures or building new ones, don't overlook the positive advantages that panels of Owens-Illinois Glass Block bring. For information and help with your plans, write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. FM-10, Box 1035, Toledo 1, Ohio.

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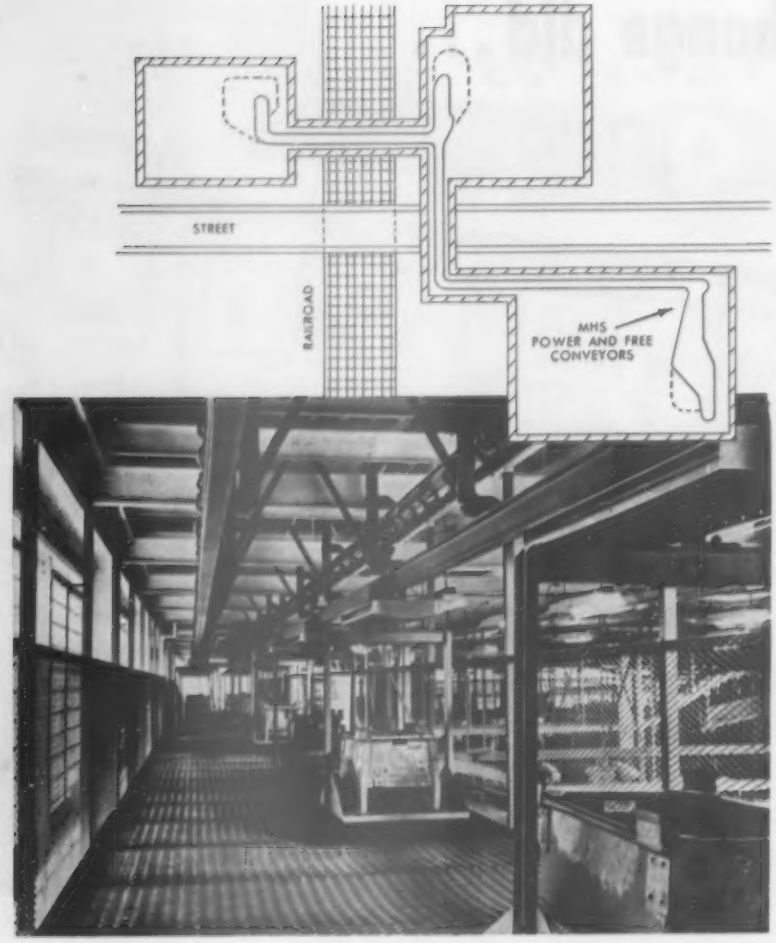

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interchangeable features of spray gun nozzles, fluid tips, needles. *Sharpe Mfg. Co.*

42—Welding. Catalog 2350 explains an inert-gas-shielded metal arc-welding process. Schematic shows how components work together. Actual photos and specifications of manual and automatic equipment, accessories, welding wire. 16 pages. *Air Reduction Sales Co.*

43—Wrenches and Hand Tools. 111 spiral-bound pages cover wide variety—sockets, ratchets, handles, power shanks, pliers, pullers, drills, storage chests, tool sets, etc. Drill table; tables on drill sizes, wrench openings. Catalog 54-1. *Snap-On Tools Corp.*

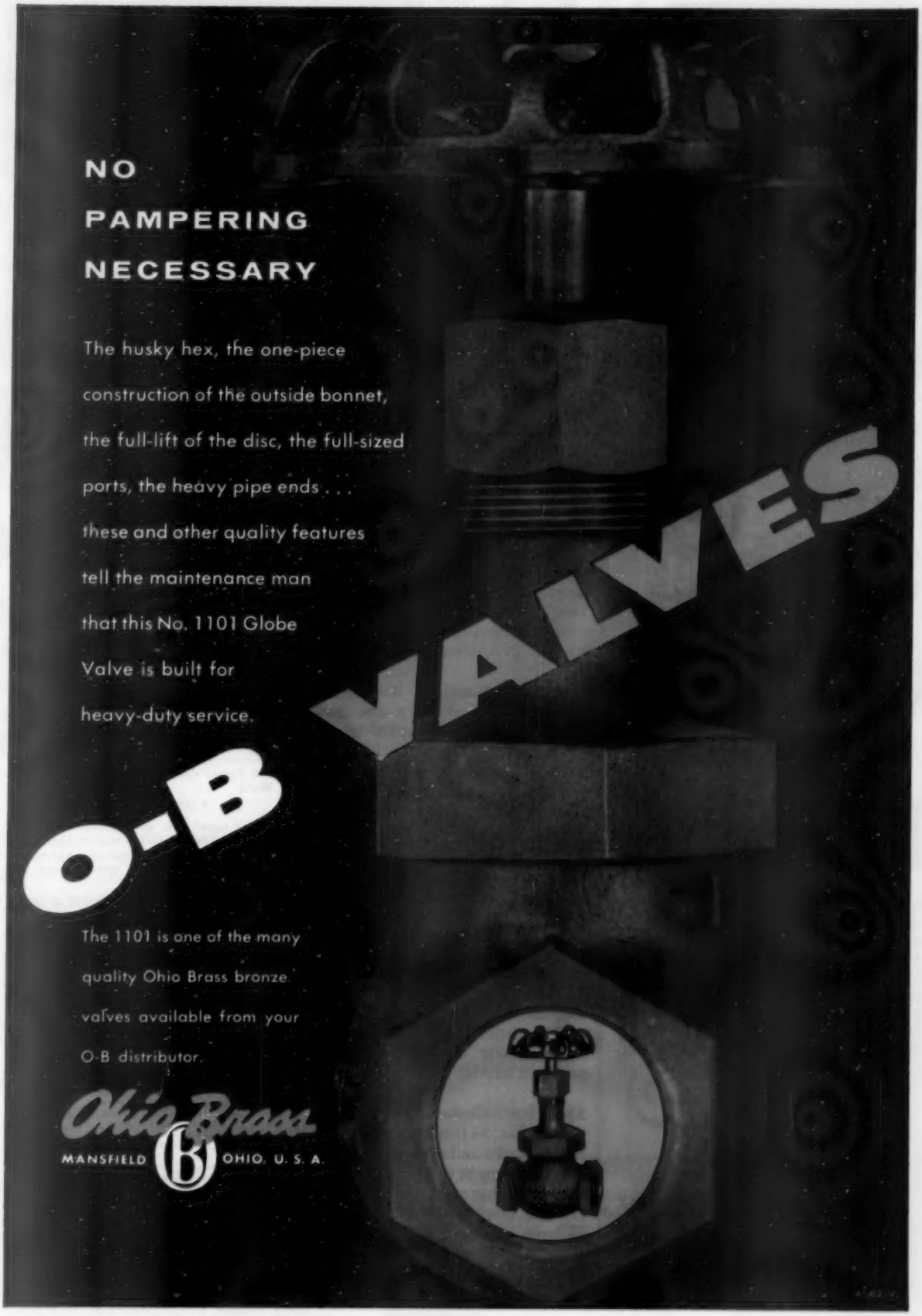
44—Flexible Shaft Machines. Three series (9 models) for filing, polishing, burring, sanding, grinding, wirebrushing are featured in Circular No. 580. Includes many attachments with cutaway views, recommended combinations for use. 24 pages. *Pratt & Whitney.*

45—Honing Machines. Catalog 1154 includes bench-type, coolant unit that converts any dry honer to wet; mandrel driver that makes any drill press a vertical honer; honing heads for most drill presses. 20 pages. *Superior Hone Corp.*

46—Mixers. How to choose the right one is the subject of this 8-pager (R-1701-B1). Information on correct mixing action, uniformity of batches, conversion to automatic batch operation, dustproof operation, maintenance, and installation. *Worthington Corp.*

47—Resistance Welding. A three-phase method using electronics for balanced current is given in Bulletin 332-10. Outlines advantages of lower installation costs and power bills, no current compensators, greater weld consistency, longer electrode tip life. *Sciaky Bros., Inc.*

Turn the page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48—Electric Heaters. Bulletin No. 750 covers "Chromalox" units for heating, cleaning, pickling, plating solutions. Models for mounting through tank walls, side-arm mounting, side-hung immersion units, outside-wall clamp-on flat heaters. *Edwin L. Wiegand Co.*

49—Hacksaw Blades. Pocket-size 12-pager lists many types and sizes for hand and machine use. Makes recommendations for use with 13 metals. Includes table of 9 saw failures, their cause and correction. Discusses proper number of teeth. *Henry Disston & Sons, Inc.*

50—Polishing Wheel. Here's the story on an all-coated abrasive wheel that shapes itself to the contour of object being polished. 6-page folder explains how to shape "Kon-Toor" wheel. Photos show use in rotary, straight-line, semi-automatic set-ups. *Behr-Manning.*

51—Rotary Machines. Bulletin 75-B covers hand and power machines, rolls, accessories. Throat and throatless combination, bending, crimping units; setting down machines; seamers; closers; and power table. 6-page selection chart. 24 pages. *Niagara Machine Tool Works.*

MATERIALS HANDLING

52—Sling Chains. Catalog S-55 covers single, double, triple, and quadruple types. Specifications, illustrations, working load limits for Cam-alloy, steel, and wrought-iron grades. Information on minimum safe diameter of worn links. 16 pages. *Campbell Chain Co.*

53—Fiber Containers. Slim-Jim Catalog No. 54 features handlers for delicate radio and electronic components. Shown in color are tote boxes, trays, other receptacles, with removable compartments sized to fit all types of electrical parts and assemblies. 24 pages. *National Vulcanized Fibre Co.*

Turn the page

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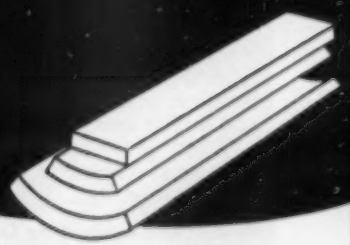
USES—ALLTEMP is recommended for insulating high temperature surfaces such as oil stills, boiler walls, breechings, furnaces and other equipment where surfaces to be insulated reach 1600° F.



Now, answer *all* your insulation problems with a completely *new* pipe and block insulation—Carey ALLTEMP! Eight years of development went into its making. New performance records were set during exhaustive field and laboratory tests. Here it is—*a brand-new industrial insulation* for all temperatures up to 1600° F.

ALLTEMP keeps every last BTU on the job producing power. Its extremely low percentage of shrinkage—approximately ⅔ *less* than other 1200° F. insulation materials—means joints won't open, cracks won't appear in covering. BTU's are *locked in!* ALLTEMP retains its high thermal efficiency and structural strength even after long, continuous exposure to excessive heat and moisture. Non-brittle, it resists blows, abrasions; won't crack or crumble under severe service conditions. And it's easy on the hands—easy to cut, fit, install!

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Just address coupon below.

ALLTEMP RECOMMENDED THICKNESS

Nominal Pipe Size Inches	Temperature Difference °F 90° Air					
	200	400	600	800	1000	1200
	Nominal Thickness, Inches					
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2	1	1½	2	2½	2½	3
2½	1	1½	2	2½	3	3½
3	1	1½	2	3	3	3½
3½	1	1½	2	3	3½	3½
4	1	1½	2½	3	3½	4
4½	1½	2	2½	3	3½	4
5	1½	2	2½	3	3½	4
6	1½	2	2½	3½	4	4½
7	1½	2	2½	3½	4	4½
8	1½	2	3	3½	4	4½
9	1½	2	3	3½	4½	5
10	1½	2½	3	4	4½	5
11	1½	2½	3	4	4½	5
12	1½	2½	3	4	4½	5
14 & Over	1½	2½	3½	4	4½	5½

ALLTEMP is available in clean, easy-to-handle flat and preformed blocks. "Nesting" O.D. pipe covering sizes provide accurate, tight fits for multiple layer construction. Only a limited number of "prime" units are necessary for unusual assemblies.

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54—Pallet Rollers. Bulletin presents a swivel type that goes in any direction, with a capacity of 4000 lb., and a dolly type of 2000 or 4000-lb. capacity. Photos and cutout drawing show roller positions. Construction and specifications. *Penco Engineering Co.*

55—LP-Gas Vehicles. Brochure details performance advantages of LP fuel systems, available on complete line of fork lift trucks (with exception of one model) and tractors. Schematic drawings and diagrams show operating and engineering features. *Towmotor Corp.*

56—Single-Mast Lift Truck. Operating advantages of the "Monomast" are illustrated with many photos in this 6-page folder (Form 1402). Points out how unobstructed view of load and forks results in faster, safer output, with minimum driver fatigue. *Hyster Co.*

57—Power Strapping Machines. Bulletin pictures automatic strapping of cartons, boxes, bundles, coils. Shows application in food, floor, chemical, apparel, metal, machinery, publishing industries. Illustrates four models, listing specs. *Signode Steel Strapping Co.*

58—Steel Storage Racks and Bins. Special Data Bulletin 105 contains comprehensive illustrated information, specification data, and technical details of units for heavy-duty requirements. Offers custom order service, in which maker specializes. *Bernard Franklin Co.*

59—Trucks. 24 cost-cutting ideas from major industries are presented here. Action photos show fork trucks, platform trucks, cranes, etc., solving automation, production, and special problems. A variety of loads are illustrated. *Elwell-Parker Electric Co.*

60—Hoists. Three bulletins (H-37, H-38, H-39) on three types — a heavy-duty unit for medium lifting; a rope-control, wire rope unit with

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If you want top-quality, long-lasting files—choose Disston. They cut fast, smooth, easy. You'll do better filing with a Disston whether American or Swiss pattern types.

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DISSTON METAL CUTTING BAND SAWS. Hard-edge, flexible-back band saws cut smoothly through metal, plastics and wood. Tooth edge only is hardened, and specially heat-treated to insure long service without resharpening. For your safety and convenience 100′ coils ⅛″ to ½″ wide are supplied on Disston safety reels. The special reel prevents stock from springing out. Unused stock can be rewound—no loose ends can cause accidents.

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PIVOTED MOTOR BASE

Automatically matches the Belt Tension to the Load

- Automatic Tension Control
- Reduces Maintenance Cost
- Automatic Belt Take-Up
- Improves Bearing Life

A belt drive cannot transmit power without tension. Tension is necessary to give the belt constant grip against the groove sides in a V-Belt—or the pulley face in a flat belt drive. A TENS-A-MATIC Motor Base automatically provides the necessary variations to compensate for changes in the driven load.

By floating with the load, TENS-A-MATIC Bases increase belt life, transmit horsepower more efficiently, maintain driven speeds more accurately and eliminate excessive bearing wear.

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Features shelves that slide in and out like drawers.

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price comparable with electric chain hoists; and an electric hoist. 4 pages in each. Engineering features and specs. *Harnischfeger Corp.*

61—Lifting Magnets. Bulletin 35-C will interest those with problem of handling bulky or ferrous materials. Complete selection information, size and operating data, specifications, dimensions on circular and rectangular magnets. 8 pages. *Stearns Magnetic Corp.*

62—Hand Trucks. Illustrated in Bulletin HT-101R are seven basic models available from over 200 styles. Presents selection plan which allows you to custom-design a truck to meet exact needs by combining any frame, any nose, wheels to fit, any accessories. *Magline, Inc.*

63—Truck Lease and Payment Plans. "Earn-Its-Own-Way" plans on all of maker's trucks and accessories are presented in this 6-page folder. Offers leasing of equipment to 9 years. Or extended payment purchase, payable in 6-36 months. *Automatic Transportation Co.*

64—Dispensers and Taping Machines. 50 models for pressure-sensitive tapes are shown in this 16-pager. Includes manual, semi-automatic, and fully automatic dispensers, specialized taping machine. Covers four basic taping principles. *Minnesota Mining & Mfg. Co.*

65—Roller Conveyors. Catalog 60A shows a heavy-duty mobile unit for straight sections, roller curves, spur sections, sliding switches, converging sections, vertical lift and horizontal gate sections — permanent and portable. 20 pages. *E. W. Buschman Co.*

66—Strapping Machine. If you ship or handle products weighing up to 100 lb., you'll want this brochure on a semi-automatic round steel strapping machine. Illustrates a wide range of uses. *Gerrard Steel Strapping Div.*

Turn the page

HALL LABORATORIES, INC.—A SUBSIDIARY OF HAGAN CORPORATION, PITTSBURGH, PENNSYLVANIA

Hall Industrial Water Report

VOLUME 3 OCTOBER 1955 NUMBER 5

It Takes a Lot of Water Conditioning To Manufacture Paper

Ten billion tons of water are required annually for many uses in the papermaking industry. Production has increased from less than one ton per day in the first mill in the United States to 26,656,000 tons in 1954. Water-connected problems of all kinds are handled in over two hundred papermaking plants by Hall service engineers.

Pollution Abatement Program Cited by State Authorities

In connection with its waste disposal problem, an eastern paper manufacturer with the advice of Hall Laboratories set up an investigative and remedial program supervised by Hall staff engineer Herman A. Reda.

The plant had been discharging its industrial waste waters into a waterway supplying a city of 130,000. Pollution was so severe that septic conditions developed when there were periods of low flow. The fact that potable supplies were affected made the situation quite serious.

The removal of contamination, required by the state, was accomplished by utilizing air flotation units to clarify the water and remove the pulp fiber. This equipment functioned so efficiently that both the water and the fibers of pulp could be re-used. The selection of this equipment was based on pilot plant studies which indicated a 97.1 percent removal of suspended solids and a 95 percent reduction in oxygen consuming material.

$100,000 per year is the plant's estimate of the value of the reusable pulp recovered by the in-plant changes and treatment processes recommended by Mr. Reda. Sufficient clarification of white water to permit re-use on the paper machines reduced the plant over-all water consumption.

The reduction of wastes at their sources was, of course, one of the most important results of this work. In their report to the General Assembly of Delaware, the Commission stated that the cooperation received from industry in this particular study, investigation, and follow-up was most satisfactory and exemplary.

Maintenance Cost Reduced

A Canadian newsprint plant was running efficiency tests throughout the plant. At the suggestion of Hall engineer J. C. Skerrett, the plant carried out a three-month test on a paper machine to determine the effect of Hagafilm® in improving heat transfer by cleaning out old corrosion products and controlling return line corrosion.

Pleased with the results of this test, the plant decided to run a test on their Flakt dryer, a separate unit, where leakage due to corrosion was a problem. Overtime for weekly welding of the interconnecting piping of the steam and condensate headers was a costly item.

Leaks stopped within one week after a Hagafilm feed of 2ppm was started, and since there has been no recurrence after six more weeks of operation, it is obvious that maintenance has been reduced to almost the vanishing point.

Hall Engineer Reports on Service

Putting a new boiler into operation can bring up some unexpected problems as the following reports from a Hall engineer on another paper plant show.

Discussed recommendations outlined in my letter to the plant. Lined up plant for boiling out new boiler. Also discussed variations in raw water characteristics.

Returned to plant for initial operation of hydrogen zeolite unit. Suggested that plant start to decrease rate of blowdown as more of the blended water is used. Boiler-water test results showed deficiencies of phosphate and sulfite. Had them increase feed of chemicals.

Went over operation of sodium-hydrogen zeolite unit setup. Found that system was cut into service only twice a day as the clear well level did not drop appreciably. Checked clear well water to determine whether or not raw water was getting into the system and found it O.K.

Learned that the plant had been operating for four days with an acid boiler water. Investigation indicated the cause to be faulty operation of the flow control valve. Immediately cut off the hydrogen zeolite unit and went to straight sodium zeolite make-up.

Called to check on plant since we eliminated the acid in the boiler water. Boiler-water alkalinities now around 16 ml and plant is again blending the sodium-hydrogen zeolite water.

A while ago I alerted the plant to the fact that something was wrong in the setup because of unexplainable high alkalinity and high phosphate consumption. My checks on the clear well and condensate revealed nothing. However, about ten days ago, things became very upset and clear-well water indicated contamination. Investigated and found that main sewer line carrying backwash water from raw-water filters was broken and that there were cracks in the clear well. The sewer runs alongside the clear well. Contamination occurred whenever level in the clear well was low, allowing water to seep in.

Director of Hall Laboratories Receives A. S. T. M. Award

Dr. Everett P. Partridge has received the 1955 Max Hecht award of the American Society for Testing Materials for "30 years of outstanding contributions to the technology of industrial water."

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

RIGHT TOOL
in the right place
at the right time!

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● No time lost hunting *the right tool* when this carefully planned Snap-on set is at hand. No time-wasting "make-do" with sloppy misfit tools! Each of the 166 tools in the set is a basic in handling operations most frequently encountered in all types of maintenance work. In orderly arrangement in the big six-drawer chest, they are *safe*, and right at the finger tips when needed. Available through your nearby Snap-on factory branch. For free 104-page catalog of 4000 Snap-on hand and bench tools, write

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FACTORY / CATALOG NEWS
Begins on page 156

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

AIR HANDLING

67—Fans. Non-overloading backward curve units are featured in 44-page Bulletin 2500. Discusses construction, bearings, temperature and altitude corrections. Performance curves, detailed capacity and dimension tables. Illustrated. *Robinson Ventilating Co.*

68—Steam Humidifiers. Bulletin No. 500 tells how humidity affects profits; hygroscopic materials; health, dust, static. Lists advantages of steam humidification, giving operation, selection, installation data on maker's line. 16 pages. *Armstrong Machine Works.*

69—Warm Air Heaters. Five "Thermobloc" models—gas- and oil-fired—are described and illustrated in this 8-pager. Full-color cutaway of the heater. Dimension drawings of floor set and suspension models. Installation photos. GC-4-55. *Prat-Daniel Corp.*

70—Propeller Fans. 40-page Catalog A-109A presents a new bypass duct fan and a double ring reversible fan. Includes 18 other types of ventilators, plus intake units, unit heaters, accessories. Specs, dimensions, and performance figures. *Hartzell Propeller Fan Co.*

71—Dust Collectors. Bulletin No. 270-A1 gives the answers to five basic dust problems; shows units for solving each—from moderate to heavy collection of fine to bulky particles, wet and dry. Cutaway of inside arrangement. 6 pages. *American Air Filter Co.*

POWER TRANSMISSION

72—Rolling Bearings. 52 pages of engineering drawings, dimensions, shaft sizes, weights, radial load ratings of ball and roller bearings. Includes pillow blocks and flange cartridge mounts. Bulletin A-638. *Dodge Mfg. Co.*

Turn the page

PAINTING ANALYSIS

Learn how new Glidden painting service can help you cut costs!

New Formula NEV-A-RUST dries to a sparkling high gloss; has greater resistance to rust, acid, gases, fumes. Ideal for structural steel, iron fences, grillwork, smokestacks, metal roofs and all metal surfaces.

Now Glidden offers a no-cost, no-obligation analysis of *any industrial painting problem.* This new service can be as comprehensive as you wish—anything from stain for a paneled office to special paint formulations to end corrosion on a water tower. A Glidden Painting Analysis can help you train personnel, work out safety markings, make color efficiency tests or work out complete office and plant redecoration!

Pictures at left show a few of the ways a Glidden painting analysis can help you. For more information or for specific helps, fill in coupon below.

Glidden Color Studio puts professional color help at your disposal whether its safety markings for your factory or planning color to match your draperies in the case of offices.

Glidden
Professional Finishes

The Glidden Company
Maintenance Finishes Division
Cleveland 2, Ohio

New catalog includes complete specifications and product guide, selector charts, color chips, information on surface preparation, special finishes of all types—this book is a *must* for reference; training of personnel; purchasing guide.

Fill in and mail to The Glidden Co., Dept. FM-1055
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- ☐ I am interested in complete details of Glidden Painting Analysis.

I am particularly interested in:

- ☐ NEV-A-RUST; other anti-corrosion finishes.
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- ☐ Color Studio Service
- ☐ Safety marking
- ☐ New Glidden complete-line catalog

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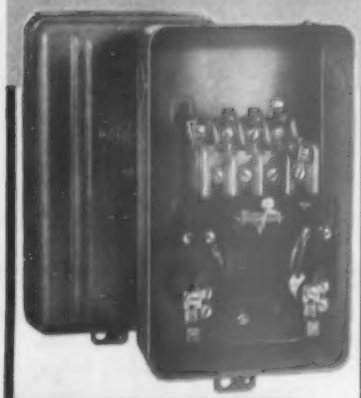

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CAPACITY

The many in-between sizes in the Furnas Electric line allow you to choose the control that is best suited for your particular job.

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You can save up to 40%. By selecting the exact size starter for your requirements you get a starter that is more compact.

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BATAVIA, ILLINOIS
Sales Representatives in all Principal Cities

FACTORY / CATALOG NEWS
Begins on page 156

To get these catalogs, circle item numbers on the Reader Service card next to back cover.

73—Speed Variator. Bulletin K-200 lists 10 advantages of a drive that provides variable speeds to 9:1. Discusses simplicity of unit, operating characteristics. Shows sectional assembly. Tables of horsepower and torque ratings. 8 pages. *Cleveland Worm & Gear Co.*

74—Dry Fluid Drive. Cross-section and dimension drawings of the drive and coupling, explanations of flow charge and thermal protecting unit give low-down on "Flexidyne." V-belt drive recommendations for all sizes. Selection charts. 12 pages. *Dodge Mfg. Co.*

75—Torque Converter. Brochure tells how you can improve performance of equipment by addition of torque converter combinations. Shows cutaway views of six types of available power packages. Chart aids selection for your engine and operating load. *Borg-Warner Corp.*

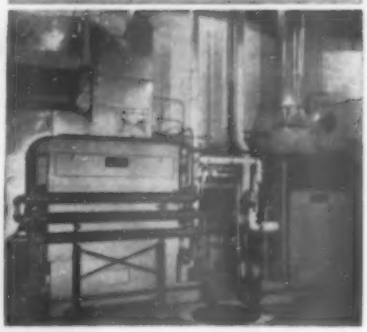
MISCELLANEOUS

76—Faster Reading. Bulletin presents a two-point program to help you gain 50% faster reading with better comprehension. Explains use of a Tachistoscope to develop seeing skills by taking in more words at a glance; then a reading pacer that molds these new skills into better reading habits. *Keystone View Co.*

77—Storage Batteries. Here's the story on a battery similar to that developed for guided missiles, now commercially available. Tells how long life (10-year guarantee, 20-years' use), reliability, minimum maintenance, quick charging, make up for initial cost. 16 pages. Form SA-130. *Sonotone Corp.*

78—Rubber Doors. Heavy-duty door that will flex when struck is subject of this folder. Describes six construction features with the aid of close-up diagram and photo views of important parts. Includes mounting information and diagrams. *Stic-Klip Mfg. Co.*

DRY AIR...
PRECISELY AS YOU WANT IT



The Niagara Controlled Humidity Method using HYGROL Moisture-Absorbent Liquid

is best and most effective because...it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because...the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Inexpensive to operate because...no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

Write for full information; ask for Bulletin 112. Address Dept. F

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ANOTHER *first* FOR GERLINGER

Torque Converter now available on All
GERLINGER *Long Wheelbase* FORK LIFT TRUCKS
(Capacities: 12,000, 15,000, 16,000, 18,000, 20,000 and 22,000 lbs.)

WHAT MAKES THE NEW TORQUE CONVERTER DRIVE on GERLINGER

THE HOTTEST NEWS IN THE HEAVY-DUTY FIELD?

HERE'S WHAT TORQUE CONVERTER DOES FOR YOUR GERLINGER FORK LIFT TRUCK!

1. **Reduces clutch wear to absolute minimum.**
2. **Maximum power and torque available for starting without slipping the clutch.**
3. **Uniform power flow protects entire drive system ...saves wear-and-tear on tires.**
4. **No stalling on grades or lugging of engine at low speeds.**

WHAT **PERFORMANCE!** Here they are! Versatile, rugged Gerlinger Fork Lift Trucks...the undisputed leader for brute strength, especially over rough or muddy terrain... *now available with Torque Converter for increased performance and new advantages!*

WHAT **SAVINGS!** The universally accepted hydraulic Torque Converter Drive will pay for itself in reduced maintenance due to smooth acceleration and cushioned engine operation.

WHAT **POWER!** Automatically combining speed and pull, the Torque Converter puts a new dimension to P-O-W-E-R in the fork lift truck that's recognized as a powerhouse in the heavy material handling field!

WITH OPTIONAL TORQUE CONVERTER DRIVE OR STANDARD TRANSMISSION . . . GERLINGER OUTMANEUVERS, OUTLASTS ANY COMPARABLE FORK LIFT TRUCK. *Let us prove it!*

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ABC...and the Reader

BACK IN 1914—forty-one years ago—a group of advertisers, advertising agencies and publishers joined in a project that has come to mean a great deal to the millions who, like you, read business magazines. The project, initiated at a time when circulation claims were rarely verified, was intended to achieve and maintain higher standards of integrity in publishing and advertising practice by providing means to audit paid circulation. Out of that effort came an organization known as the Audit Bureau of Circulations, a voluntary, non-profit, cooperative association, known for short as ABC. Its symbol appears at the head of this page.

We are proud that McGraw-Hill publications were among the founders and charter members of the Audit Bureau of Circulations.

Today the Bureau numbers 3,670 members. These include advertisers, agencies, and publishers of newspapers, farm papers, general magazines and business journals such as this one. These publisher members hold their memberships and their right to display the ABC symbol in their publications only so long as they live up to the circulation standards that are established through the Bureau.

It is one thing to set up high standards; it is another to see that those standards are maintained. This latter and all-important function is performed by a staff of auditors maintained by ABC to check periodically on the circulation practices of the publisher members. When a business magazine, such as this one, joins the Bureau it agrees that the ABC auditors shall have "the right of access to all books and records." Their inspection may dig into the files of original subscription orders, payments from subscribers, paper purchases, postal receipts, arrears of payments, editorial expenses and many other significant items. Sometimes the auditors go behind the records and seek verification of purchase and payment from subscribers themselves.

The information thus obtained and certified by the Bureau then becomes available to the public and constitutes an authoritative report on the publication's circulation practices.

The advertisers and agencies benefit directly from the ABC because it provides a generally recognized factual yardstick by which the circulations of member publications can be measured and appraised. Every paragraph in an ABC report on a business publication gives the advertisers data that help them make intelligent use of the publication as an advertising medium.

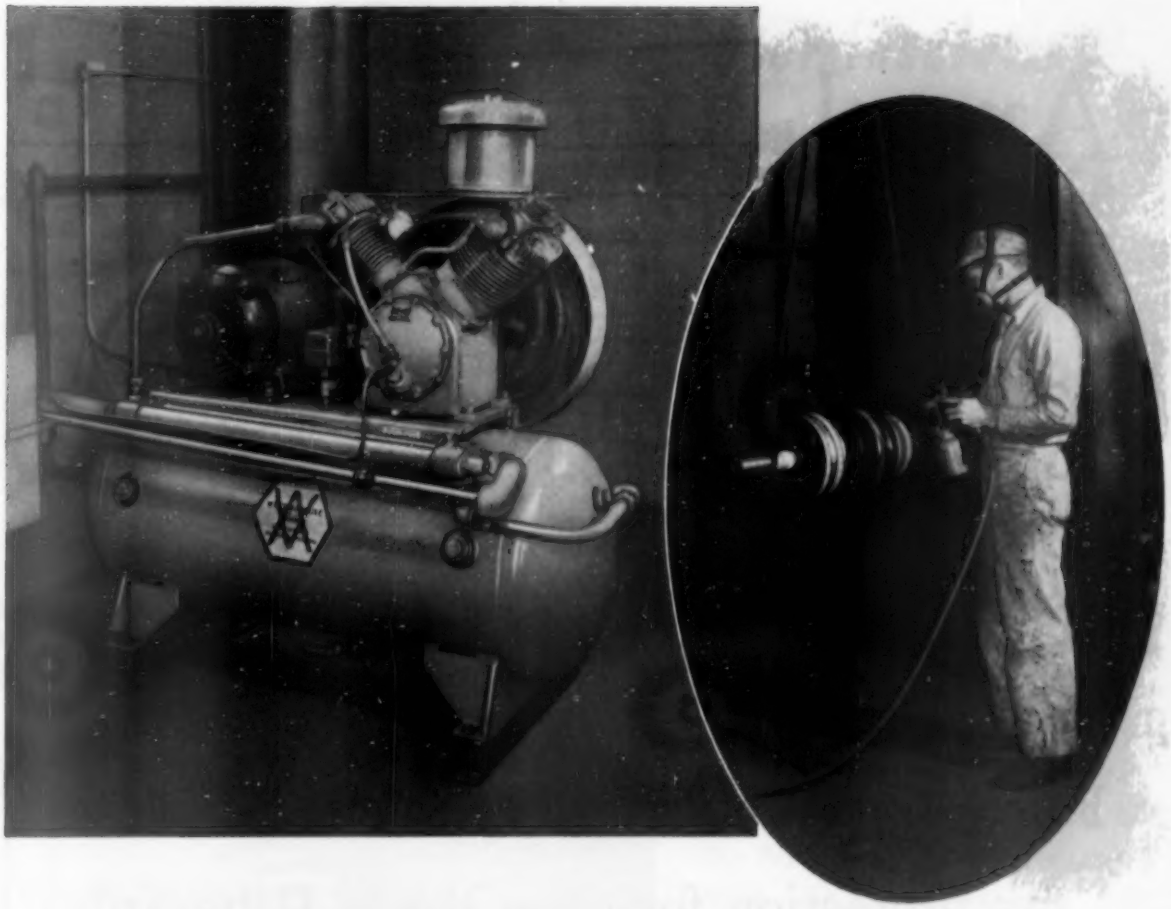
But the ABC renders a service of vital concern to the *reader* as well. The Bureau audits paid circulation only, and it is through this payment, whether by subscription or newsstand purchase, that the reader keeps the editorial policy of a publication responsive to his needs. His decision to buy or not to buy records his judgment on each publication, and the ABC-audited and certified circulation reports make the sum of these judgments known to all concerned.

So the editors of ABC publications must constantly keep their editorial services up to the mark if they are to survive a competition in which the reader's right to buy or not to buy is paramount. Each paid magazine or newspaper will prosper or fail as it wins or loses the voluntary patronage of thousands or millions of readers. And—the ABC is scorekeeper in this vital contest.

Thus the publisher who submits his publication to the supervision and discipline of ABC affirms in the strongest possible manner his recognition that his primary obligation is to his readers and that he owes the standing of his publication to a voluntary demand by those readers.

All this is what makes the ABC brand on a publication so important to its readers. That respected symbol, testifying to the advertising value of the publication, serves also as a constant reminder to all concerned that the reader's willingness to pay for an ABC publication is the basic reason why it stays in business.

McGraw-Hill Publishing Company, Inc.



Paint a Brighter Profit Picture

...use the flexibility of air to cut costs in your plant, and Westinghouse Air Compressors to cut the cost of your air

Spray painting, drilling, bolting, grinding, punch press operation — there are countless ways that the flexibility of air power cuts costs, improves profits.

Because air power is so useful, it is important to have a dependable supply — important to have a Westinghouse Compressor.

Only Westinghouse can give you all 15 of these features: Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity flywheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

So paint a brighter profit picture. Use air power and get it at its low-cost best from a Westinghouse Air Compressor. Sizes up to 40 horsepower. Write for details.

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Ansul Dry Chemical Piped Systems Now U.L. Approved For Industry-wide Use

For the first time, Automatic Dry Chemical fire protection for class B and C hazards

The science of fire protection took a big step forward when Ansul's *Dry Chemical Piped System* was approved by Underwriters' Laboratories. Eight years of development and field application made this important approval possible.

Ansul's Dry Chemical Piped Systems provide instant, around-the-clock protection for such hazards as paint dip tanks, spray booths, generators, flammable liquid pumping stations, exhaust ducts—wherever there is a hard to reach or highly flammable stationary installation.

Automatic or manual systems, or a combination of both, are available. Also, by using automatic selector valves, one piped system can protect two or more separate hazards.

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Call the Ansul Man!

Get in touch with your local Ansul man through the "yellow pages" or write ANSUL CHEMICAL COMPANY, Fire Equipment Division, Dept. F-74, Marinette, Wisconsin. *Write Ansul for your copy of new Fire Equipment Catalog.*

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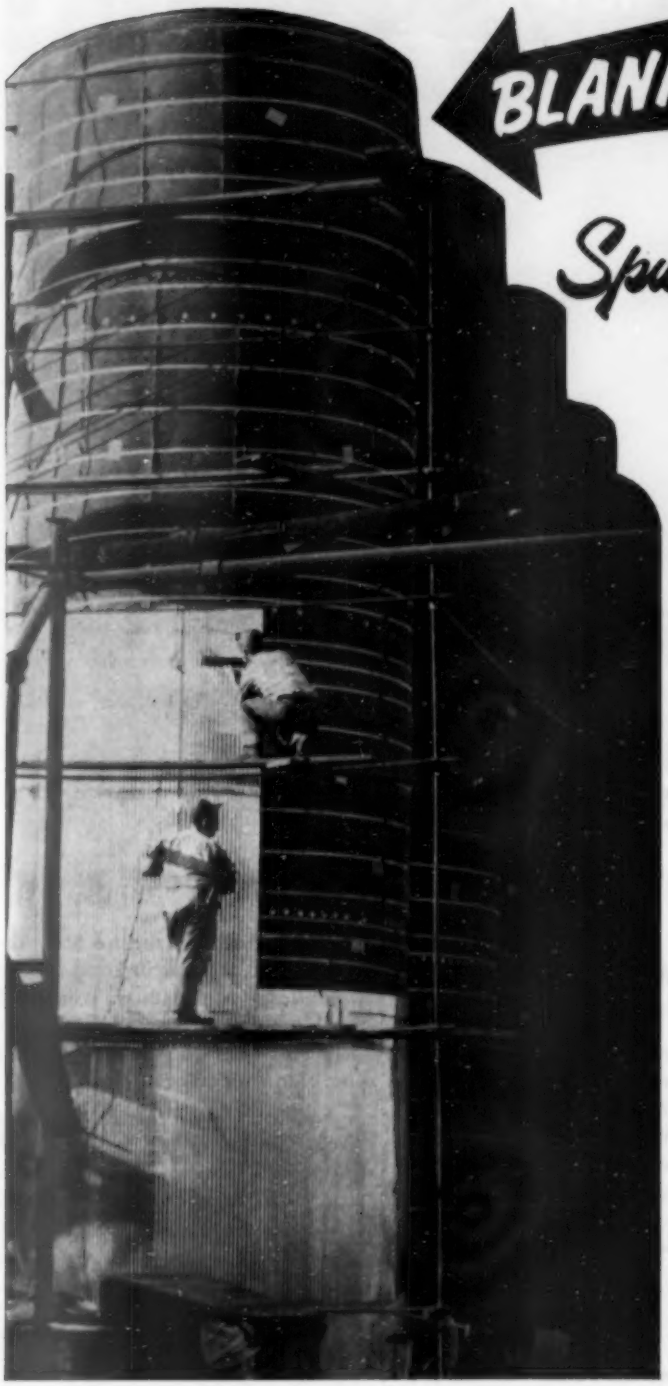
NOW... a better insulating



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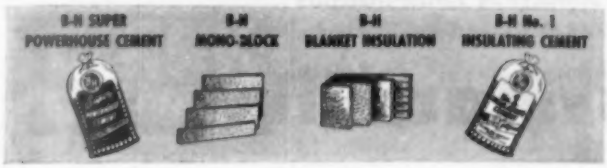
BALDWIN-HILL Spun MINERAL WOOL

Baldwin-Hill Insulating Blankets now have lower density but greater strength due to the longer, finer mineral wool fibers produced by the NEW B-H spinning process. With the lighter weight, B-H Blankets are applied with amazing ease and speed.

Storage Tanks insulated with 1½" thick B-H Blankets having 1" wire mesh on one side; expanded metal lath on other side.



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Johns-Manville now announces

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asbestos smooth-surfaced

Built-Up Roofs

for deck inclines from dead level to ½" per foot

The new Johns-Manville Aquadam asbestos smooth-surfaced built-up roof has been especially designed to give the best possible protection to a building and its contents.

The Aquadam Asbestos Smooth-Surfaced Roof Specification, like the recently announced J-M Aquadam Slag-Surfaced Specification, owes its superiority to Aquadam—a bituminous asphalt cementing agent developed exclusively by Johns-Manville and employed in the application of the roofing felts.

J-M Aquadam provides these important advantages

- **greater weather resistance**
- **greater resistance to cracking**
- **improved self-healing properties**
- **greater kettle stability**
- **greater adhesion**
- **stronger bond**
- **greater resistance to water**
- **excellent uniformity**

In the Aquadam Asbestos Smooth-Surfaced Roof Specification all the qualities of Aquadam are combined with the time-proven advantages of asbestos felts in smooth-surfaced built-up roof construction.

For complete information about Aquadam Built-Up Roofs, see your Approved Johns-Manville Contractor. He's listed in the classified telephone directory. Or write Johns-Manville, Box 158, New York 16, N.Y. In Canada, 565 Lakeshore Rd. East, Port Credit, Ont.

See "Meet the Press" on NBC-TV, sponsored on alternate Sundays by Johns-Manville

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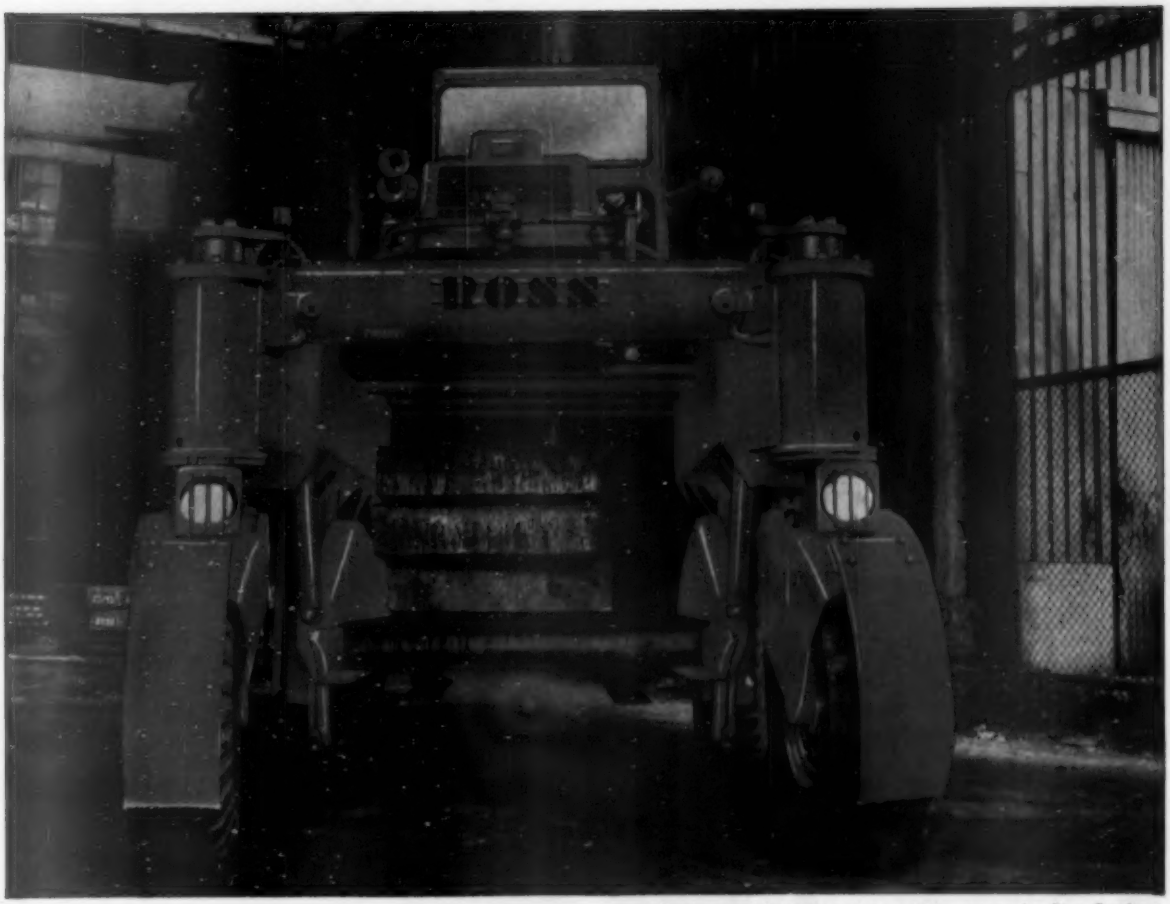

Delivering semi-finished steel to outside storage by Ross Carrier—Kaiser Steel Corp., Fontana Works, Fontana, California.

Here's production flow ingenuity...

Kaiser Steel's 1 2 3 Operation!

1 A foreman calls for material over a two-way radio.

2 Immediately a Ross Carrier rushes into action . . . locates the material.

3 Loaded in seconds, the Ross Carrier is on its way to delivery.

No hold-up of production flow at Kaiser Steel. Blooms and slabs of semi-finished steel are rushed at a moment's notice to specialty mills for treatment. Four highly maneuverable Ross Carriers, equipped with two-way radio, have greatly reduced rail hauling within the plant site . . . have made operations between conditioning yards, storage yards and the mills, a fast, *modern* operation.

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FREE—a 16-page idea book! Gives you 21 industrial applications of the Ross Carrier—profitable ideas that you can use in your own business. Just tear out this coupon and attach to your letterhead. We'll rush you a copy with no obligation.

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POST LINEAL FOOTAGE COUNTER

Connected to any Post Decitron electronic counter, the new lineal footage device permits accurate length measurement for continuous production items.

Each time the wheel revolves a photolight beam is broken and a count equal to one foot is registered by the counter. Varied "beam-hole", or wheel size will permit the counting of fractional parts of a lineal foot if desired. Different types of wheels provide traction surfaces for wire, rope, aluminum sheets, bar or flat steel, paper, cloth, etc.

Steady wheel performance is assured by frictionless bearings.

Rely on Decitron . . .
for Counting Measurement and Control

POST

New Vistas for Powder Metallurgy

Exciting developments in this important art offer new solutions to difficult problems.

MOLYBDENUM — goes from ductile sheet (pressed powder) to drawn tubing.

THE PROCESS shown at left brings the outstanding heat and acid resistance of molybdenum within the reach of more users. Electron-tube anodes, radiation shields, heating elements for high-temperature furnaces, and parts for the chemical industries are but a few end uses.

Parts can be drawn, swaged, or spun from one piece—instead of requiring expensive fabrication. And machining scrap is virtually eliminated. Other powders can also be rolled into sheet metals—to produce special alloys of iron, copper, stainless steel, or nickel, for example. Other developments:

. . . *High-alloy steels can now be formed* from pre-alloyed powdered materials, eliminating machining. Result of higher forming pressures (up to 100 tons sq. in.) obtainable with tungsten carbide-cobalt dies.

. . . *Ductile, porous stainless steel sheet can be made* with accurately controlled porosity. Now used in an aircraft deicing unit — but offers wide promise for use in special filters, sieves, etc.

. . . *Structural titanium parts soon to be made* from powdered metal. Offers way to use expensive scrap.

. . . *Spray coating of cermets over formed steel, cast iron, etc.* — to protect against excessive heat and corrosion. Nickel aluminides, for example, protect against corrosive molten glass. And zirconium diboride withstands liquid aluminum.

American Electro Metal Corp. (Circle 1, Reader Service Card.)

Oil-Repellent Paper Now Made Easily

"Scotchgard" is a fluorochemical sizing agent for coating paper with an oil- and grease-resistant film. Papers so treated are expected to find

FALLACIES AND FACTS FOR CARBIDE BUYERS

"Equivalent Grade" charts can mislead carbide users

Another blunt—but necessary—clarification by the manufacturer of Carboloy cemented carbides shows how these charts fail to disclose important facts.

Charts purporting to be "Equivalent Grade" or "Industry Standard" carbide comparison tables are now being liberally distributed in the metalworking industry. *Both titles are misnomers.*

Those who advocate their use claim or imply that:

1. These charts prove that a purchaser can safely interchange grades made by a number of manufacturers and get equal results on a given job.
2. These charts were compiled as a joint effort by all carbide manufacturers.

Neither statement is entirely factual.

THE FACTS ABOUT CLAIM NO. 1

The so-called "Equivalent Grade" charts are an attempt to convince carbide purchasers that any of the grades listed for a particular job will perform equally well. *This is not in accord with the facts.*

No two carbides are exactly alike in over all performance. Their production abilities vary tremendously because of differences in composition, metallurgical structure, manufacturing techniques, and quality control. For example, Carboloy Grades 883 and 44A have identical chemical composition. Yet because they are completely different structurally, they cannot be used as "equivalents."

Because no two carbides are exactly alike in performance, attempts to force them into arbitrary cubbyholes on the charts lead, inevitably, to poor machining results. The weakness of using the charts to select "equivalent" grades is easily demonstrated by two examples:

1. Carboloy manufactures four different cast-iron cutting grades to handle various conditions. Several other manufacturers have one or two grades to cover the same range. Now it is quite possible that competitive grades might work out in general, but in the specific areas covered by our four grades, *they would not provide optimum performance.* Yet all the grades are in the same classification on the charts . . . with no attempt made to distinguish their particular advantages.

2. Carboloy's new steelcutting Grades 350 and 370 do not fall under *any* of the general chart classifications. If included at all, Grade 370, for example, is usually placed under the designations "C-5" and "C-6." Yet we know from experience that Grade 370 will give far longer tool life than our Grade 78B, *which has the same classification numbers.* Obviously, the two grades are not in the same category in terms of production ability. Yet the charts would lead purchasers to believe that they are "equivalent."

THE FACTS ABOUT CLAIM NO. 2

Despite anything to the contrary, these charts were not compiled as a joint effort by all carbide manufacturers.

Obviously, every carbide manufacturer should recommend the types of cutting applications each of his grades is designed to handle. This is part of his responsibility to the customer.

However, as far as the Carboloy organization is concerned, our recommendations stop with giving data about our own grades. We have compiled test and case-history information on them. We know exactly how they will perform. But we are not in the position to give similar data on other manufacturers' grades—nor is anyone else better qualified than ourselves to give data on our grades.

But several other carbide manufacturers have decided, apparently, to assume this responsibility. Their compilations—under the title of "Equivalent Grade" or "Industry Standard" charts—are now being widely circulated in the trade. The use of these titles may lead the carbide buyer to believe that the chart has been agreed to by all manufacturers. This emphatically is not the case.

AND, THE GREATEST FALLACY

Unlike steel, which can be changed somewhat by heat-treating or other operations after it is delivered, the properties of carbides cannot be altered.

This means the purchaser should know exactly what he is buying . . . and that he should insist on a carbide with consistent production ability.

The important factor of consistent operation is not covered in *any way* by the so-called "equivalent charts." And this, we feel, is perhaps the most important fact not brought to the attention of the carbide user who relies on the charts when specifying grades for his job.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11135 E. 8 Mile Ave., Detroit 32, Michigan

Carboloy Created-Metals for Industrial Progress

DE LAVAL last longer

ONLY Faultless TRIPLE GREASE SEALED CASTERS

Have NEOPRENE VULCANIZED SEAL

Positive Protection for Swivel and Wheel Bearings wherever steam, dirt, chemicals, water are encountered

SERIES 900GS CASTER
Cut-away to show grease sealed double ball bearing swivel.

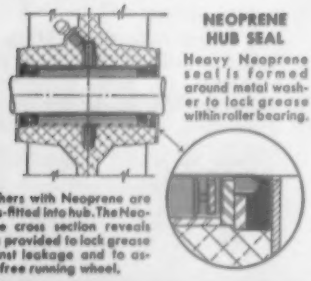
LEAK-PROOF NEOPRENE RETAINER MOLDED AND VULCANIZED ON UPPER BEARING SWIVEL RACEWAY. PATENT PENDING.

2

THRUST BEARING GREASE RETAINER TIGHTLY FITTED AROUND FORMED, HARDENED RACEWAY. CAN BE EASILY REMOVED FOR CLEANING OR INSPECTION.

3

NEOPRENE RING PERMANENTLY ATTACHED TO METAL WASHER AND PRESS FITTED INTO HUB.



NEOPRENE HUB SEAL
Heavy Neoprene seal is formed around metal washer to lock grease within roller bearing.

Washers with Neoprene are press-fitted into hub. The Neoprene cross section reveals area provided to lock grease against leakage and to assure free running wheel.

Here's a Caster so precisely sealed against live steam and sand blast, that pressures up to 80 lb. per sq. in. could not penetrate the raceways. No lubricant dripped out. No sand got in. All of the original grease was intact and would continue to lubricate the bearings indefinitely.

CUTS MAINTENANCE and MAN-HOURS

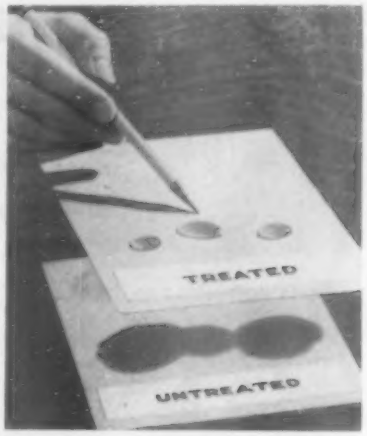
Neither water, dirt, chemicals or high temperatures affect the maneuverability of the Series 900GS Caster. A permanent film of grease, between the Neoprene vulcanized seal and top-plate, greatly reduces friction—accelerates swiveling—minimizes "down-time" and plant interruptions. Write today for Bulletin 157-3G, no obligation.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, INDIANA

FACTORY / MATERIALS NEWS

Begins on page 286

For more about these products, circle item numbers on Reader Service card next to back cover.



wide use in packaging machinery parts, oily materials like putty, calking and sweeping compounds, etc. The new chemical coats each separate fiber of paper with a film. Yet it will not affect the strength porosity, flexibility, appearance, or color of the paper. While most effective with kraft papers, it can also be used with laminated and coated papers — and to obtain oil resistance both on fiber drums and paper board containers.

Minnesota Mining and Mfg. Co. (Circle 2, Reader Service Card.)

3—Devcon is an 80% steel–20% plastic mixture that is as easy to work with as modeling clay. Yet it becomes as rigid and strong as steel two hours after addition of a special hardening agent. Requires no heat or pressure. For making low-cost jigs, fixtures, dies — or for filling holes and building up metal walls. *Chemical Development Corp.*

4—Construction Panel is made of strong, lightweight, insulated plastic. Called Hasko-Struct, the sandwich panel has a core of foamed polystyrene and faces of reinforced glass fiber sheet. Provides thermal insulation plus moisture and corrosion protection. Available in 1-, 2-, 3-, 4-, and 5-in. thicknesses — special sizes to 18 in. *Haskelite Mfg. Corp.*

5—Rock-Seal combines neoprene and silicone rubbers with other compounding agents to produce a tough, resilient coating. Chemically inert,

DE LAVAL OPPELLER PUMPS

last longer... cut maintenance costs

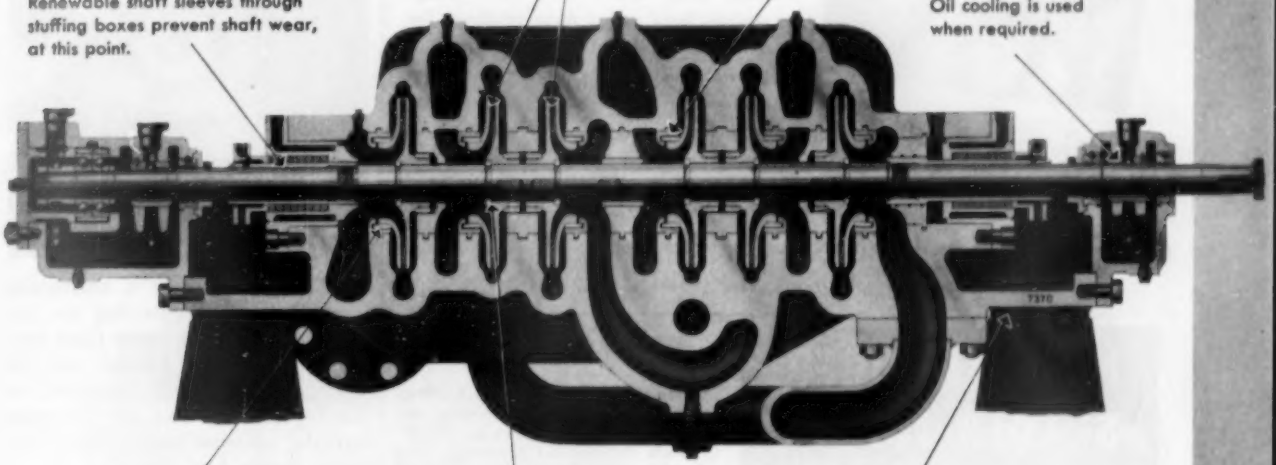
Stages are arranged to reduce differential pressures between stages. This insures permanent sealing at the casing-joint and at interstage diaphragms.

Pairs of back-to-back impellers balance axial thrust. One-purpose thrust bearing carries no radial load, maintains axial alignment.

Labyrinth wearing rings permit safe clearances and reduce wear.

All bearings are ring-oiled, sealed against contamination by water or dust. Oil cooling is used when required.

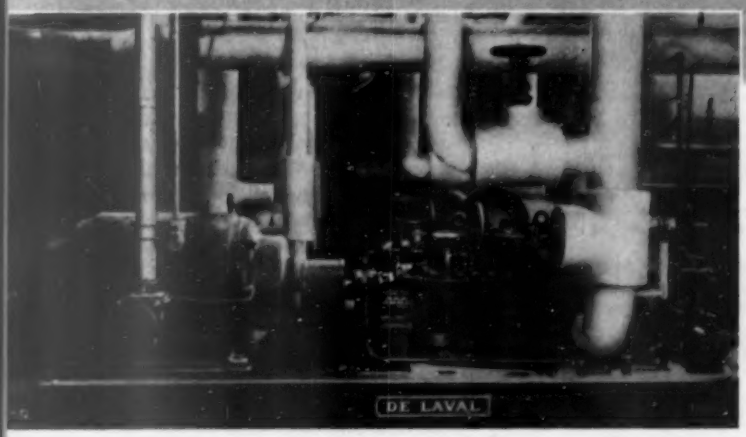
Renewable shaft sleeves through stuffing boxes prevent shaft wear, at this point.



Threaded impeller wearing rings make replacement easy without heating or damage to impellers.

Individual impeller mountings, with split locating rings, make interstage shaft sleeves unnecessary. Impellers can't shift with shaft expansion and contraction.

Casing support insures coupling alignment at any operating temperature.



Here are two De Laval 6-stage Oppeller Pumps used for boiler feed service in an industrial installation.

The design features above show clearly why De Laval Oppeller Pumps stay on the line longer and cost less to maintain. These pumps are used for boiler feed, hydraulic systems, descaling spray, mine dewatering, refinery oil pumping and similar services.

De Laval Oppeller Pumps are available in sizes from 2 to 4 inches and 2 to 8 stages; capacities to 1000 gpm, pressures to 1200 psig and temperatures to 350°F. *For complete data, write for De Laval Catalog 1502.*

DE LAVAL *Oppeller Pumps*

DE LAVAL STEAM TURBINE COMPANY

804 Nottingham Way, Trenton 2, New Jersey

DL2.54

Transportation . . . service . . . maintenance problems?

You will want to read this

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Newly compiled industrial case histories outline problems similar to many you may have . . . off-the-road transportation . . . taking power to the job . . . materials handling . . . keeping industrial property ship-shape . . . providing fire protection . . . towing and hauling. Over 70 illustrations. Read how 4-wheel drive 'Jeep' vehicles have solved these problems for others. Learn how they may do the same for you. See how they perform an almost endless variety of difficult assignments for industry today.

A copy of this useful book will be sent you without obligation. Write today for yours, to:

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Make **STRONGER SOLDER JOINTS** Faster-Cheaper with Less Waste!

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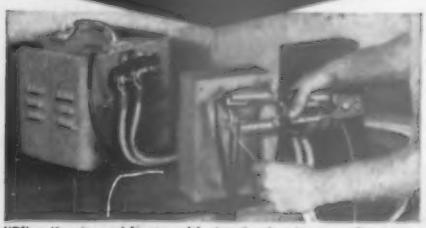

"Pliers" grip and heat—soldering leads onto transformer.

Thermo-Grip soldering is faster. Resistance heating principle requires no pre-heating — no set up. Touch the tool to the work and heating begins instantly.

It is cheaper because of its greater speed and better control. Heat is always concentrated exactly where you want it. There's no melting or burning of nearby joints or parts —no waste of parts or materials. No cold flow joints—no remakes.

Thermo-Grip makes stronger joints because of its faster, more even heating — with wires, lugs, spot or seam soldering.

Thermo-Grip is easier to use. Models available for every soldering need, from heavy brazing to miniature soldering. "Plier", "Fork" or "Pencil" attachments.

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For more about these products, circle item numbers on Reader Service card next to back cover.

non-toxic, and non-flammable. Resistant to most acids, alkalis, oils, and solvents. The compound can be applied and cured in confined areas to seal underground excavations and concrete tanks, etc. *Storage and Sealing Corp.*

6—Fluorolin 202 is a chemically inert lining for protecting the insides of metal containers from corrosive chemicals. Linings can be cut with shears and assembled on job. Pressure-sensitive adhesive backing lets you press linings into place. *Joclin Mfg. Co.*

7—Window Coating eliminates the ultra-violet and absorbs the infrared rays that get through ordinary window glass. Infropake helps to reduce color fading and summer heat. Also absorbs glare. *Infropake Corp. of America.*

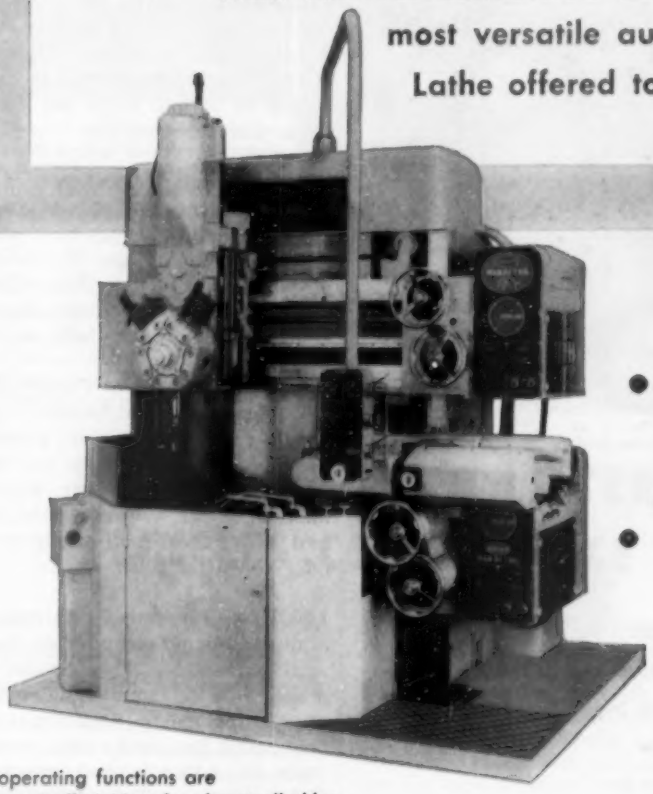
8—Silicone Impregnating Varnish has improved bonding strength and over-all toughness at temperatures up to 250 C. Will cure as rapidly at 150 C. as other silicone varnishes cure at 250 C. Low viscosity provides good penetration into electrical equipment. *General Electric Co.*

9—Best Epoxy Resin for job can be found on this selection chart. Shows important characteristics for impregnating, potting, and coating electrical and electronic components. Chart includes four new Epocast resins. *Furane Plastics, Inc.*

Turn the page

don't BUY BULLARD *unless,* YOU WANT THE BEST!

Yes, Bullard Cut Master, Model 75 with Man-Au-Trol Conversion Unit is the best . . . most versatile automatic Vertical Turret Lathe offered to industry today . . . . .



BULLARD

All operating functions are automatically initiated and controlled by one function control drum and two detector drums in Man-Au-Trol: Table Speeds (20 Available), Feeds (16 Available), Head Travel in feed or traverse, right or left, up or down or 45° in any quadrant and Turret Indexing.

Since the function control drum can be pre-set for a given job in advance, the machine down time for job change-over is reduced to a minimum.

The Man-Au-Trol Conversion Unit can be applied to any or all heads of Cut Master, Model 75 right in your plant.

Your Bullard Sales Engineer will be glad to explain the many other advantages offered by Man-Au-Trol — your best buy in an automatic vertical turret lathe — call him or write for our new catalog.

THE BULLARD COMPANY

286 Canfield Avenue • Bridgeport 2, Connecticut

Please send me a copy of the
NEW MAN-AU-TROL, MODEL 75 CATALOG

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Geared TO MEET INDUSTRIES' DEMAND FOR HIGH QUALITY CONVEYING MACHINERY

New office and engineering building, completed early in 1955. Part of an extensive program of expansion of the engineering and manufacturing facilities at the Ellwood City, Pennsylvania, plant.

Whatever the conveying problem might be — whether it involves the handling of a few pounds or many tons —**Mathews** builds the equipment to do the job. You can be sure of this service, from proposition through installation, when you buy **Mathews Conveyers.** And, of course, you get the benefit of **fifty years' experience** in continuous flow material handling.

50th Anniversary MATHEWS CONVEYERS 1905-1955

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Engineering Offices or Sales Agencies in Principal American and Canadian Cities
Export Representative—Foreign Trade Division of New York Hanseatic Corporation

MATHEWS

FACTORY / MATERIALS NEWS
Begins on page 286

For more about these products, circle item numbers on Reader Service card next to back cover.

10—Anodized Aluminum Strip is now available in continuous coils. Useful for automatic feed to punch press, shears, etc. Available in many colors, including gold and brass. Has a non-tarnishing finish that is consistent and uniform. *Fromson Orban Co., Inc.*

11—Antiox combats all forms of rust and corrosion. Leaves a dry, invisible, thin protective film over metal. Comes in four forms, for protection of various types and durations. *The Penetone Co.*

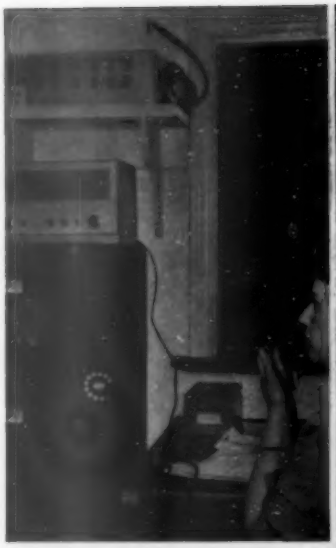
12—Dehydrating Agent is said to absorb more moisture or water vapor in low humidity ranges than other silica-type absorbents. Humi-Sorb dessicant and static dehumidifier helps when packaging materials are damaged by moisture. *Culligan, Inc.*

13—Paint Stripper for Plastics rapidly removes organic finishes — yet won't react with most plastics. Liquid Stripper #11 is safe and nontoxic — won't create fire hazard, odor, or fumes. Converts paint film into soluble form that is easily rinsed off. *Northwest Chemical Co.*

14—Damp-Proofing Paint consists of dry and liquid components, packaged separately. The powder is mixed with a liquid resin binder prior to application. Vaportite is recommended for interior and exterior walls of concrete and masonry. Comes in nine colors. *Allied Compositions Co., Inc.*

15—Durasheen is a self-polishing floor finish made especially for asphalt tile. Won't streak, spot, or cause bleeding of tile — and has excellent water resistance. Expected to give twice the life of most hard-floor waxes. *The Gilbreth Co.*

16—Kwik-Kleen removes scale to a bright finish without harming heating and cooling equipment, compressors, boilers, coils, etc. Won't harm hands either. Protective clothing not necessary. *North American Mogul Products Co.*



G-E base station located in superintendent's office dispatches orders, controls fleets of Douglas material handling units. Vehicles handle 2 times as many jobs as before.

Request for new assignment! Douglas G-E radio equipped tractor is in constant contact with supervisors and other vehicles. Speaker on dash overrides factory noise.

RADIO-EQUIPPED MATERIALS HANDLING VEHICLES COVER TWICE AS MANY JOBS

Douglas Aircraft Finds G-E 2-Way Radio Cuts Time Between Jobs, Coordinates Facilities, And Saves Money

A profitable materials handling operation depends upon efficient control, and maximum use of all equipment. General Electric 2-way radio helps the Douglas Aircraft Company do this—and saves them money.

RADIO COORDINATES OPERATION

This world-famous builder of military and civilian aircraft has radio on handling vehicles in its Santa Monica plant. Radio-equipped fork trucks, cranes, and tractors on the job at Douglas are in constant contact with dispatcher, and each other. Wherever a vehicle is working—in a remote building, at a loading dock outdoors, *anywhere,* in this 147 acre plant—the operator is under supervision, can get new orders instantly.

SURVEY PROVES RADIO ECONOMY

In one study of radio efficiency on crane type units alone, Douglas management found that radio had reduced travel distance per job tremendously. Previously, up to 60% deadhead travel had been the case—with radio, these vehicles may handle *2 times as many jobs.* On this basis, G-E radio can pay for itself in record time.

G-E LOW POWER SYSTEM

The base station transmitter is located in the transportation supervisor's office. Mobile two-way radios are on vehicles equipped with large speakers to over-ride high factory noise levels. G-E industrial radio may be operated from any of the five DC voltage systems used by handling vehicles. Mobile units perform on either 6 or 12 volt power supplies—converters are used for 24, 32, and 64 volt trucks. Units operating inside steel buildings and in the open prove the effectiveness of the Low Power radio at Douglas.

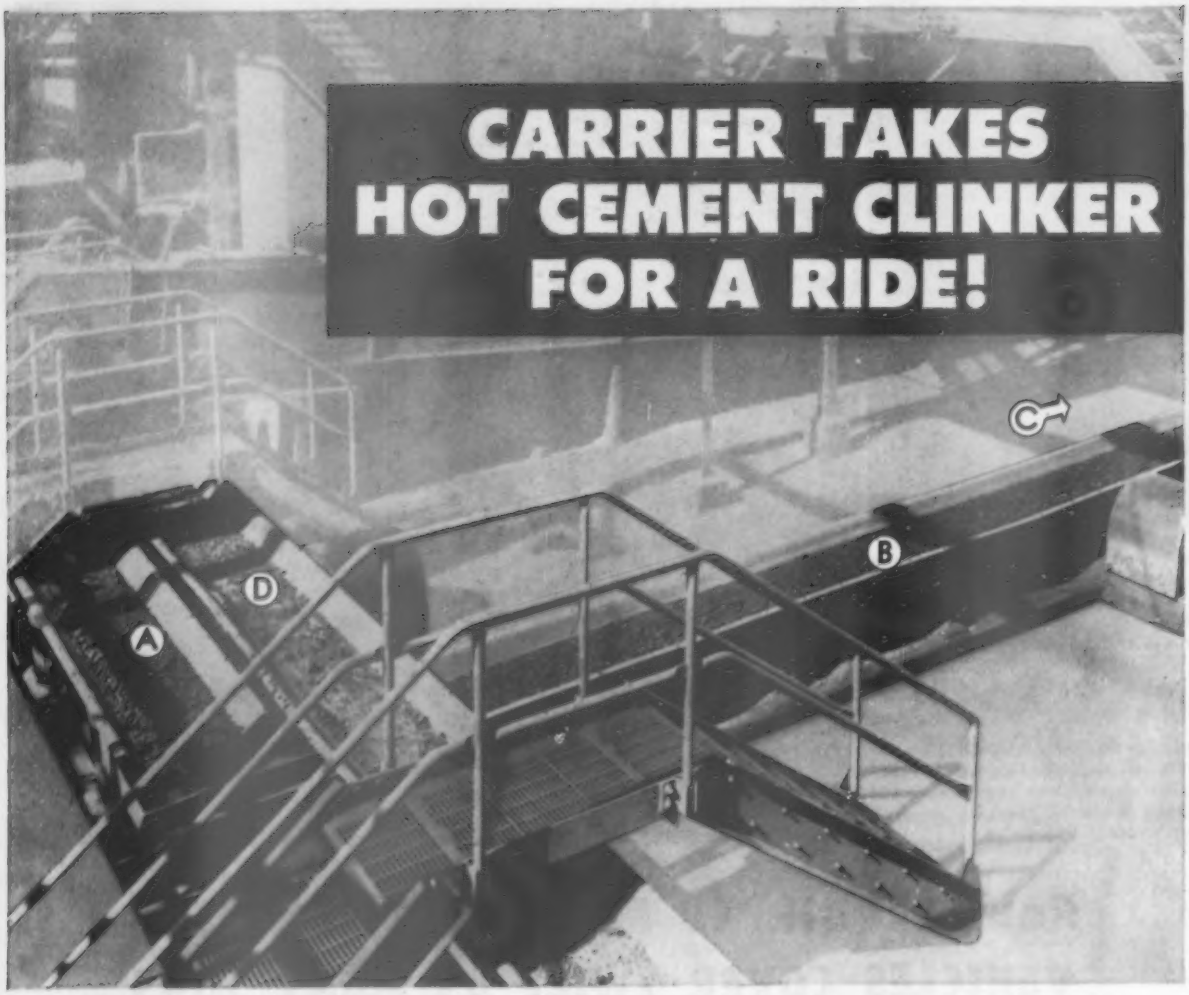
2-WAY MOBILE RADIO

INVESTIGATE G-E RADIO

A G-E Communications Counselor can show you the outstanding versatility, sturdy construction, low maintenance features of G-E Industrial Radio. Call him in, or write today to: *General Electric Company, Communication Equipment, Section X65105, Electronics Park, Syracuse, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC



Carrier Conveyor "A" takes the clinker from coolers and feeds it at right angles onto the first of two other Carrier Conveyors "B" ("C" not shown) for delivery to a bucket elevator and storage.

Carrier Conveyor "D" also takes the clinker from coolers, but conveys it directly to a different storage pit.
All four conveyors have 18" flared pans and 5HP drives, with a total length of 233'.

THAT'S hot cement clinker you see on those four Carrier Natural-Frequency Conveyors. It's being taken for a ride from coolers to two different storage pits. . . .

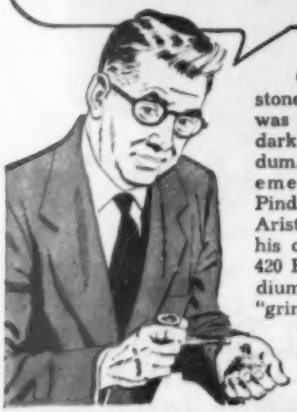
400° F. clinker is extremely abrasive — extremely tough to handle. Yet the Carrier Natural-Frequency Conveyors move it at the rate of 60 tons per hour with *a minimum of spillage, maintenance and downtime!*

Cement-industry applications are just one of many uses for Natural-Frequency Conveyors. Others include bulk chemicals, castings, ores, mill scale and slag, food products, machine turnings — all of which are now being conveyed and processed with spectacular success by Carrier Natural-Frequency vibrating equipment. Write for Bulletin 111. Carrier Conveyor Corporation, 245 North Jackson Street, Louisville 2, Kentucky.

CARRIER
~~NATURAL-FREQUENCY~~
CONVEYORS

NO. 4 OF A SERIES
ON THE HISTORY OF ABRASIVES
BY CHICAGO WHEEL & MFG. CO.

EMERY WAS USED IN ANCIENT TIMES to abrade and polish metals and other substances.



One of the important milestones in the history of abrasives was the discovery of emery, a dark granular variety of corundum. One of the first to mention emery was the Greek poet, Pindar, who wrote in 500 B.C. Aristophanes also mentions it in his comedy "The Peace," about 420 B.C., referring to it as a medium for "rubbing down" and "grinding down." It was of great value to ancient craftsmen in abrading iron and steel, gems and stone.

THE GREEK ISLE of Naxos furnished emery to the ancient world. Called the "stone of Naxos" it was highly prized, and brought high prices in the market places of Greece and the Near East.

THE ENTERPRISING GREEKS took the rough chunks of emery stone and ground them to powder. This was sieved for many applications including the polishing of gems. Even then the size of the grain apparently was important for the type of grinding or abrading to be done. Often the rough chunks or pebbles were used.

EMERY, in finely ground form, was sometimes bonded in pottery mixtures and baked to form "whetstones" or grinding stones. We can surmise that these stones were made in various sizes and shapes to suit the work to be done.

THE FINER FINISHES exhibited on tools, implements and weapons after the 4th century B.C. suggest the adoption of better abrasive materials of which emery undoubtedly was the most important. The polishing of metal, gems, statuary and wood carvings was accomplished with emery of various grains.

Emery today is one of the many abrasive substances employed by Chicago Wheel in the manufacture of grinding wheels and mounted points. Over 200 different shapes, sizes and grains of abrasive wheels are made by Chicago Wheel for every metal finishing operation.

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe
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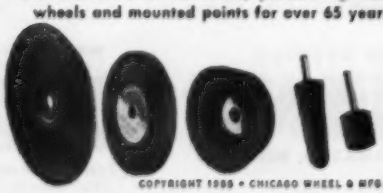
Manufacturers of abrasives, precision grinding wheels and mounted points for over 65 years.



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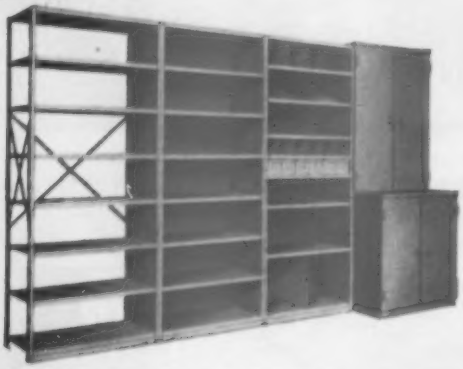
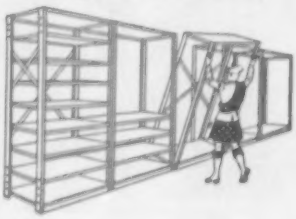
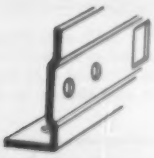


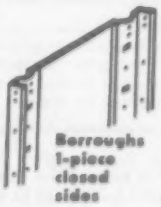
LOOK at these big features!

Each individual unit is complete in itself . . no part depends on unit next to it . . any unit or shelf can be moved independently.

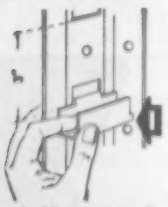




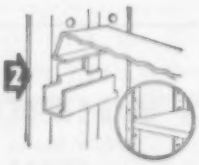
Borroughs heavy gauge rolled shaped-post for open shelving gives extra strength.



Borroughs 1-piece closed sides for closed shelving . . saves erection time.



Insert shelf support bracket . . no fumbling with studs, bolts, nuts or lock washers.



Tilt shelf into support bracket . . and shelf is ready for loading.

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A Subsidiary of The American Metal Products Company of Detroit
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SAVES INSTALLATION TIME

Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

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Light as you want it for Machine tools, assembly, inspection.

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in std. pkg. of 4
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Also Available with one arm

NEW Universal Arm Joints — Bend 150°. Large frictional triple disc bearing surface. Smooth, easy movement. Instantly adjustable by hand to direct light exactly as needed.

NEW Collar Disc Joints — Rotate 180°. Combination of 135° bend joints and 180° rotating joints provides amazing articulation for positioning reflector.

NEW Reflector — Deep pear shape design with 5" x 3¾" orifice. Accommodates 100 watt A-21 or smaller lamp.

NEW Base — Universal for horizontal or vertical mounting. Outlet box base optional.

NEW Wiring — Heavy duty Levolier switch socket interior in high impact plastic shell with Velumoid lamp seal. 8 ft. SPT-2 18/2 heavy duty plastic rip cord with molded plug.

NEW Finish — Semi-gloss Vista Green baked enamel. Reflector interior, high temperature White.

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LOCALITE fostoria for Light ON the Job

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Depends on the Reliability of Motors Like This

Allis-Chalmers motors have the most of everything you want or need

NEMA standards set size and mounting dimensions for motors but detailed examination reveals important differences. These differences may result in substantial savings to you on maintenance, expensive downtime and long-range operating costs:

- **WEIGHT OF MATERIALS** — More iron, more copper in a motor provide margins of advantage in strength, rigidity and electrical characteristics.
- **BEARINGS** — Larger, double-shielded bearings make for longer motor life, less maintenance, less chance of failing under load.
- **COOLING** — Fan-cooled motors of ribbed design (illustrated) have 40% more radiating surface than ribless frames to dispel the motor heat that can fry insulation, cut operating life.

If your company is a user of industrial motors, it will pay you to find out why Allis-Chalmers motors rate tops in ALL of these vital factors. Ask any Allis-Chalmers motor distributor, district office, or write for details to Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

A-4693

ALLIS-CHALMERS

Some sprinkler systems don't *say* anything. They work quietly, but they don't *sound an alarm at the Municipal Fire Department.*

If your sprinkler system is not arranged to call the Fire Department automatically, it will pay you to get the facts from a Gamewell engineer. He will show you how the Gamewell Sprinkler Watchman will make your sprinkler system *heard* at the fire station.

Write today for the facts.

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Chestnut St., Newton Upper Falls 64, Mass.

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FIRE ALARM SYSTEMS
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FACTORY | NEW BOOKS

Motion and Time Study—All the latest techniques in this most important tool in the industrial engineer's bag of tricks are outlined in this up-to-the-minute new book. It gives first-time coverage to such points as: the relation of automation to motion study and work simplification; extensive treatment of techniques for analyzing non-repetitive work—always a big headache; evaluation and analysis of economic, hazard, control, and psychological factors; how to review and test proposed methods; statistical concept of time study. In spite of its emphasis on new techniques, older techniques — and particularly new adaptations of old techniques—are well covered. And major attention is given to the human relations problems that are almost inherent in motion and time study, particularly for the new practitioner. Presentation is of the now-popular how-to-do-it-and-use-it type. While primarily designed as a text (it includes problems and case studies), it will be useful to even the experienced industrial engineer. *By Gerald Nadler. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 575 pages. $7.50.*

Earning Opportunities for Older Workers—There are these days, as everyone knows, formidable barriers set up against the continued employment, and particularly the hiring, of middle-aged and older men and women. This book is a compilation of the views of management, union, and government officials on such problems as employment security, workmen's compensation, pension and insurance costs, and effective utilization of older workers. The book has five major sections, each with several chapters: trends and factors in the employment of older workers, taking inventory of the older individual as a worker, older women in the work force, adapting jobs to the older worker. In these sections the aging worker is analyzed; and his changing capacities and skills, health, motivation, need for retraining are outlined. Later sections of the book illustrate methods for adapting jobs to fit the abilities of older workers, creating earning opportunities for older workers who need and want work, but can't get it. Most of the chapters are easy and interesting to read — and will start you thinking. *Edited by Wilma Donahue. The University of Michigan Press, Ann Arbor, Mich. 277 pages. $4.50.*

Process Engineering Economics — This book should prove useful to operating men faced with the responsibility of planning process operations in the petroleum, chemical, plastic, mineral dressing and metal refining, food and similar industries. It is intended as a source book of ideas for effecting savings in design and operation; covering engineering economy, cost estimation, economic feasibility of operations, how to find optimum plant size, and the like. Combines theory with actual operating data. A fairly complex book, but then this is a complex subject. *By Herbert E. Schweyer. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 409 pages. $7.50.*

Electronic Data Processing in Industry—Still a bit confused about the practicality and application of the "paperwork revolution"? Then this new book will help. It tells how to determine whether electronic data processing is for your company, how to plan the installation, what automatic equipment is available, how progressive companies are now using electronic data processing in specific fields — such as customer and general accounting, production planning, labor budgeting, materials handling, and others. Discusses applications in companies of various size, with systems of varying complexity. Interesting extra: "A Look at Future Developments." Special Report No. 3. *Dept. 8, American Management Association, 330 West 42nd St., New York 36. 256 pages. $7.75 ($5.75 to AMA members).*

Air Conditioning Manual—A newly revised edition of The Trane Company's well-known manual is now

frame it with DEXION!

New "DO-IT-YOURSELF" framing material has scores of applications in your plant

TESTING BENCH

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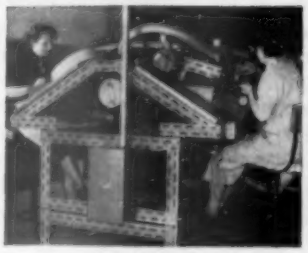
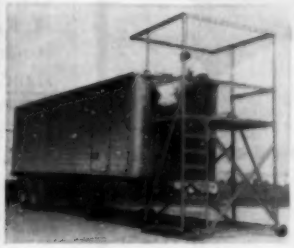


WORK BENCH



MAINTENANCE PLATFORM

STORAGE BINS

MEZZANINE FLOOR

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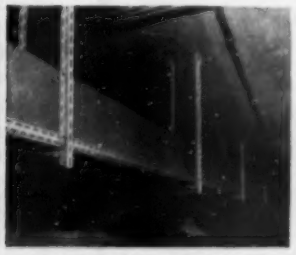
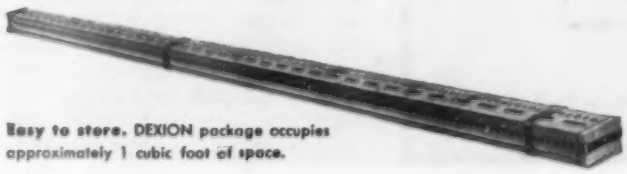


FRAMEWORK CONVEYOR

DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".



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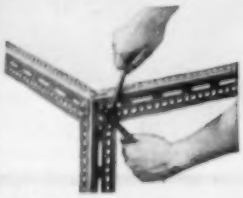
Anyone who can handle a wrench and a saw (or Dexion Cutter) can build with this precision-made, galvanized steel angle. And DEXION is so easy to use or re-use! There's no drilling—no welding—no waste. DEXION is strong and rigid—lasts a lifetime—and the price is amazingly low.



Simple to connect. All you need are two wrenches. No special parts—no training necessary.

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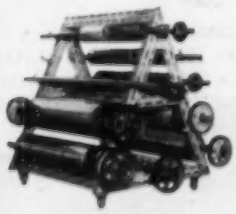
Easy to measure. Diamond-shaped cutting marks spaced 3" apart.



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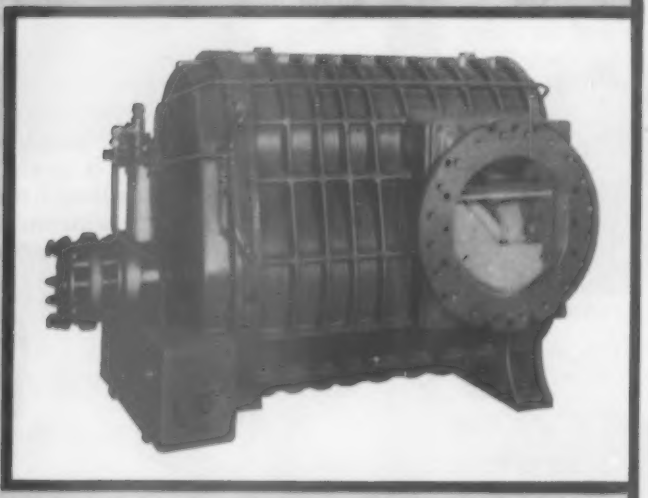

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Standardaire Blowers offer a greater capacity per pound of blower and less power consumption.

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Begins on page 298

available. New material on heat and comfort, refrigerants, quantity and condition of air supply and other data is included. The new manual has been brought completely up to date in regard to terminology, illustrations, symbols and abbreviations, charts and reference tables, in accordance with ASHAE standstandards. *Educational Division, The Trane Company, La Crosse, Wis. 380 pages. $6.50.*

BOOKLETS

American Standard—Minimum Requirements for Sanitation in Places of Employment — This is a new American Standards Association standard. It covers, primarily, drinking water, washing and toilet facilities, rest and change rooms. Can be used as a workable minimum for plant executives concerned with such facilities in new or modernized plant planning. Standard also covers lunchrooms and other facilities for industrial food handling. Designated Z4.1-1955. *American Standards Association, 70 E. 45th St., New York 17. 50¢.*

A Guide for the Organization of Fire Safety in Modern Industrial Establishments — Plant operating men interested in setting up an effective in-plant organization for fire safety will find this new booklet interesting and informative. It outlines the recommended development of a fire safety organization on both a plant and a multi-plant basis, with emphasis on the "fire safety" aspects of loss prevention. NFPA No. 6-M. *National Fire Protection Assn., 60 Batterymarch St., Boston 10. 18 pages. 35¢.*

Tested Approaches to Cutting Production Costs—Drawing from material presented at a recent AMA Special Manufacturing Conference, Special Report No. 4 is designed to help plant operating men pinpoint areas where efforts at cost-cutting should be most rewarding. Among those listed, with specific information on effective attack, are: indirect labor, materials handling, manufacturing cycle, quality control, in-

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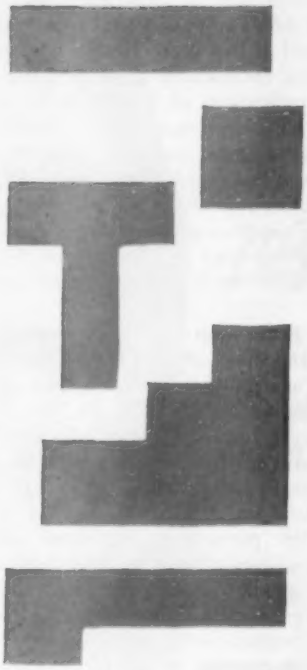

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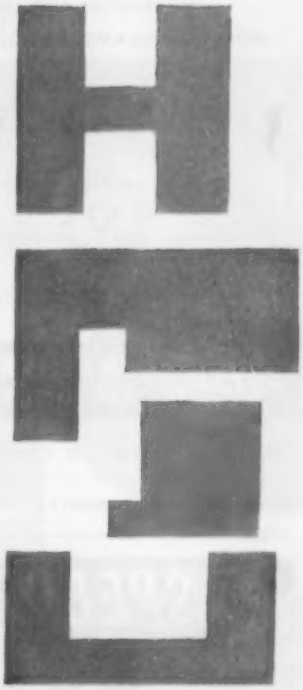

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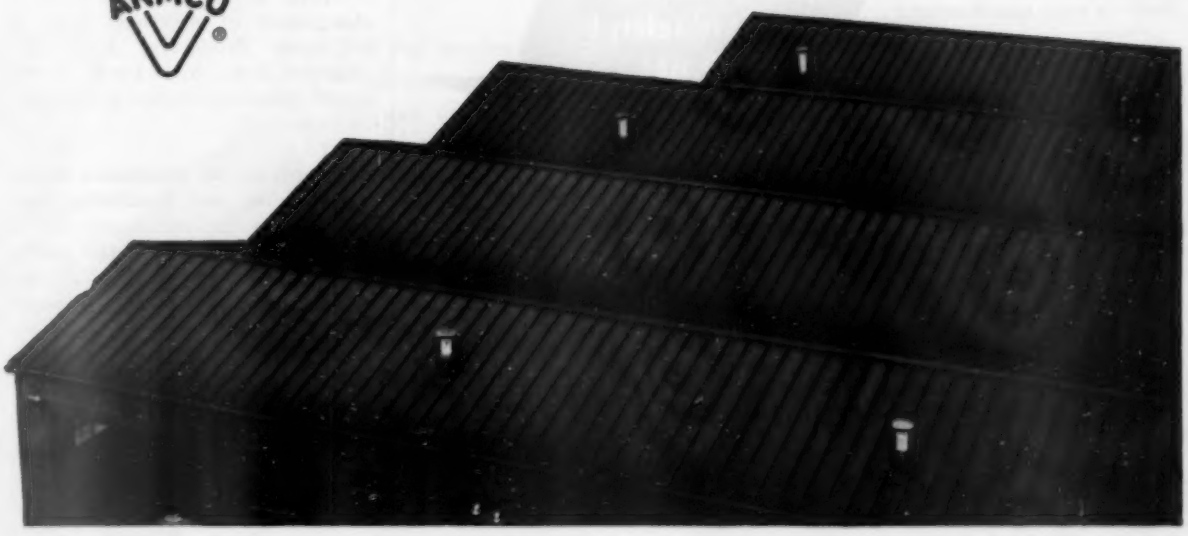

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√ To meet the charging requirements of higher capacity batteries, Hertner has developed the KXM charger. All of the latest automatic features and conveniences are incorporated into this new KXM model.

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For complete information and specifications write for Bulletin No. 212.

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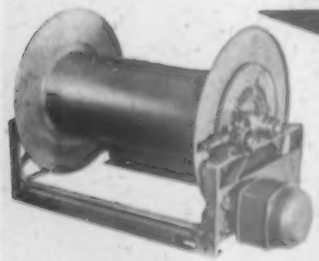

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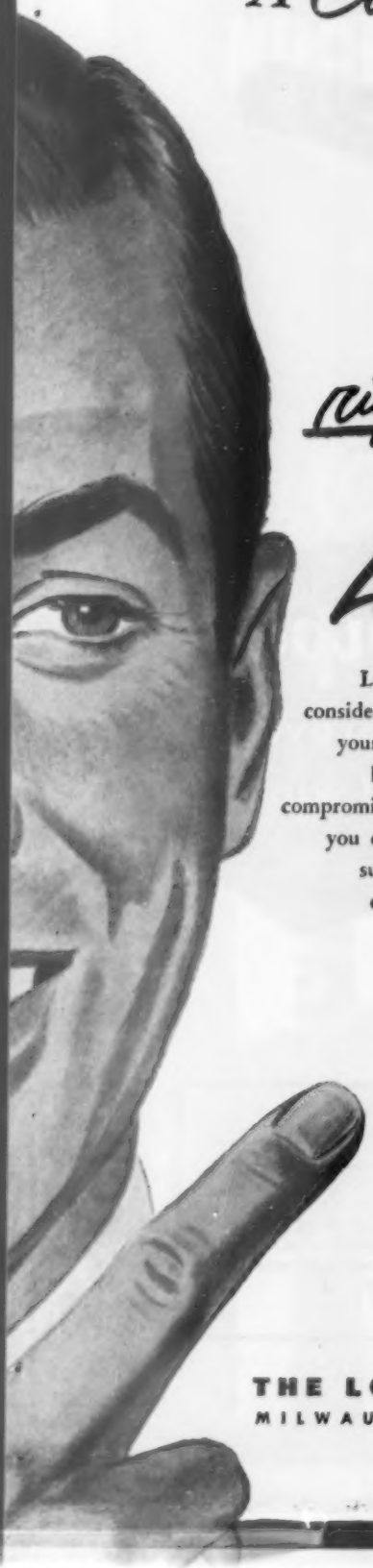
ventory management, maintenance, paperwork. *Publication Sales Dept. P, American Management Association, 330 West 42nd St., New York 36. 128 pages. $3.75 ($2.50 to AMA members).*

Know Your Packaging Materials—A compilation of papers presented at the AMA's Packaging Conference in April of this year. The 18 papers describe outstanding properties, typical applications of a wide range of materials, some new. Three groups of materials are covered: foils, paper, and boxboard; films; and foam plastics. *Publications Sales Dept. P, American Management Association, 330 West 42nd St., New York 36. 123 pages. $175 ($1 to members).*

The Prevention of Occupational Skin Diseases—Public Health Service statistics reveal that industrial dermatoses account for 75.3% of all occupational diseases. If your plant record is any where near this astounding percentage, this little booklet should prove invaluable. It contains preventive measures for many causes of skin disorders, outlines specific procedures plant executives should inaugurate. Nothing complex — the author, former medical director of the U. S. Public Health Service, says that skin diseases can "be radically reduced by the inauguration of adequate plant cleanliness programs, and most skin diseases can be entirely avoided." *By Louis Schwartz, M.D. Association of American Soap & Glycerine Producers, Inc., 295 Madison Ave., New York 17. 44 pages. Single copies free. Bulk quantities at cost.*

Standards for the Installation of Air Conditioning and Ventilating Systems—With the increasing use of air conditioning in industrial plants, the problem of fire-safe installation becomes more important. This booklet outlines the best procedures for smoke-removal systems, construction and installation of ducts, automatic fire doors and dampers, fans, controls, and the like. NFPA No. 90A. *National Fire Protection Assn., 60 Batterymarch St., Boston 10. 22 pages. 35¢.*



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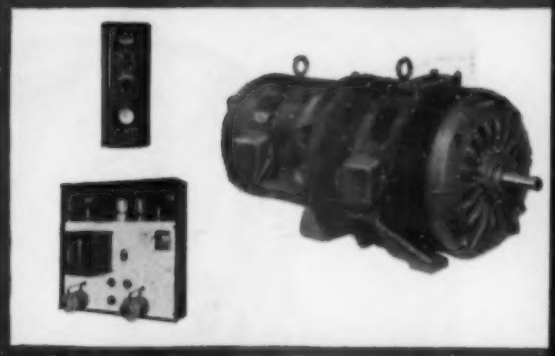

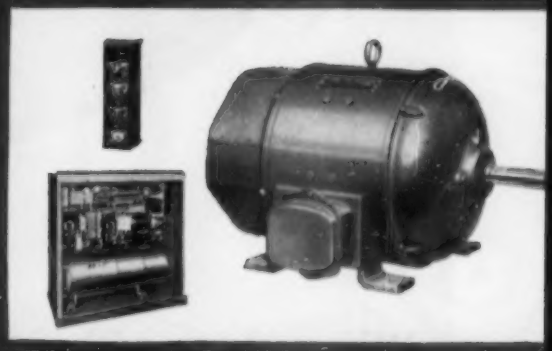

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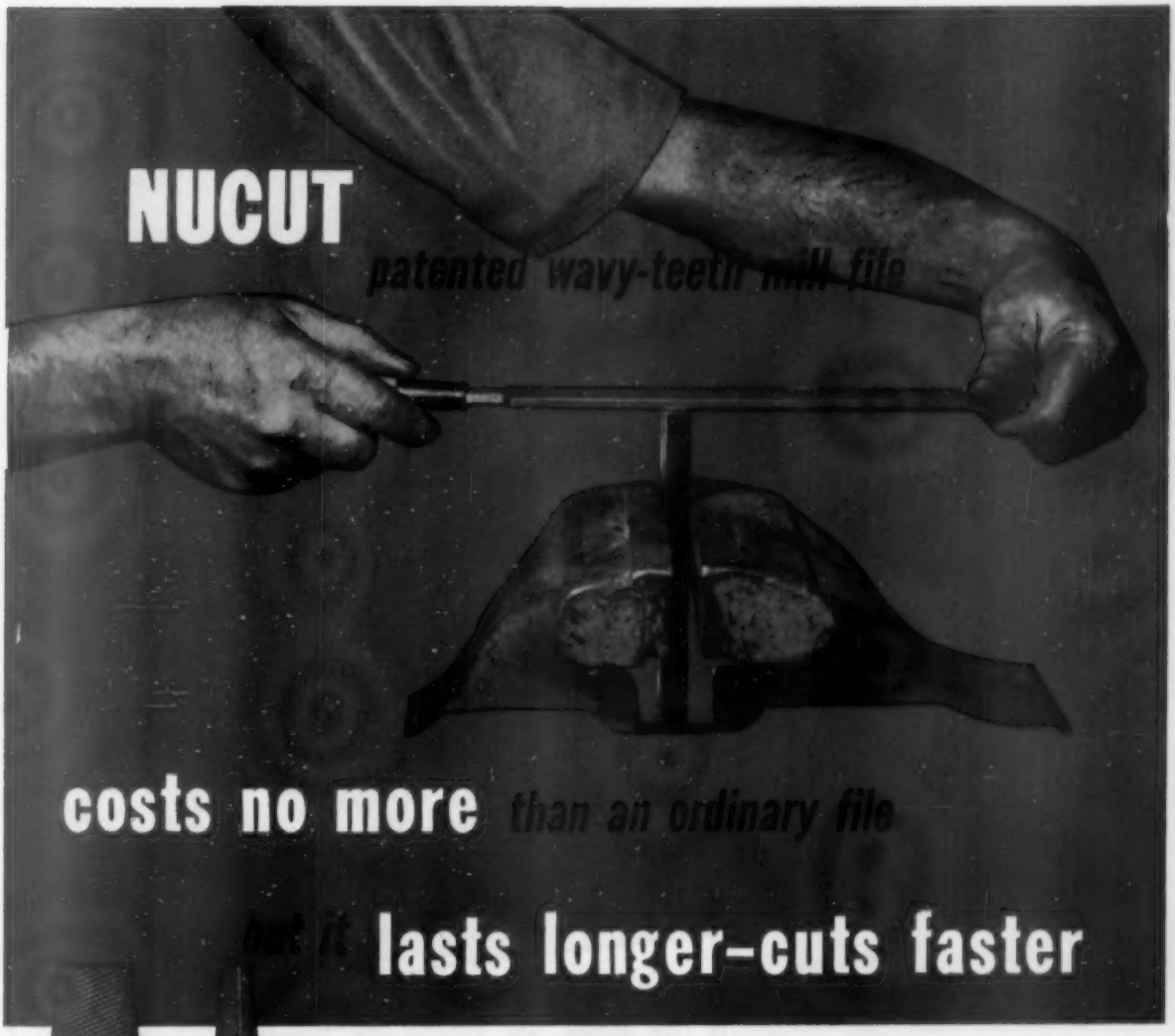

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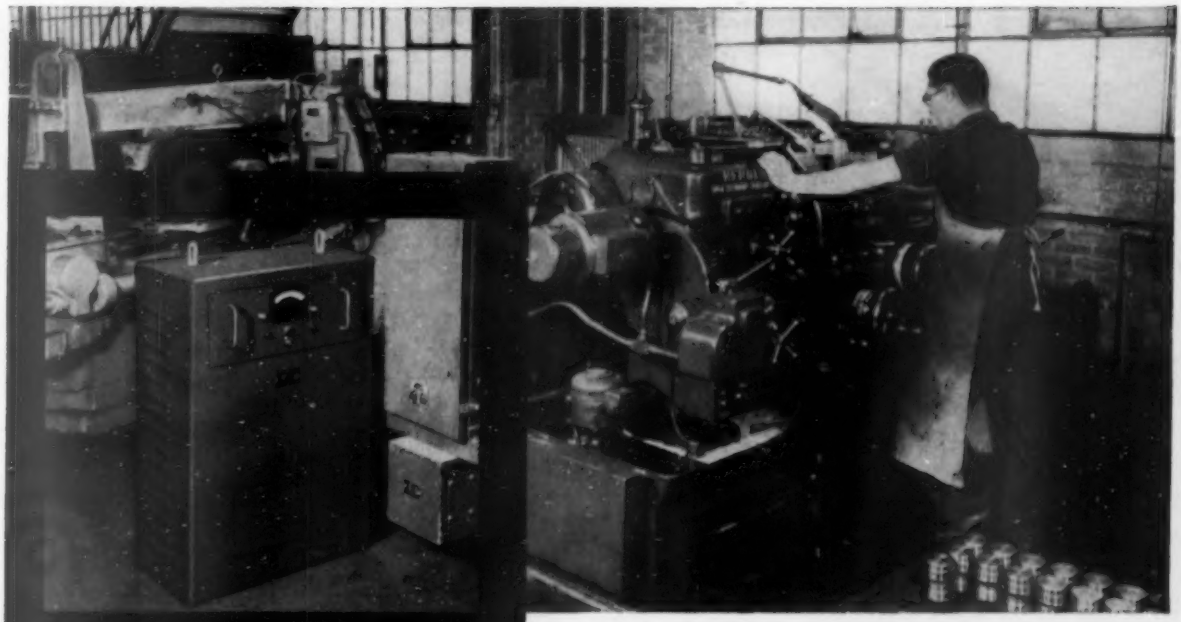

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When a supplier's truck pulls into the unloading bay of this industrial plant, a Peerless Packet Trolley Hoist takes over. A worker picks up the load with this easy-to-operate trolley hoist, conveys it over an I-beam to the racks, and stores it in its proper place in a matter of minutes. The supplier is in and out quickly, the worker is available for other jobs, and there's no cluttering of floors and aisles. Investigate Peerless Packet Trolley Hoists. They make lifting easy, cut handling time materially, require little maintenance. Ask your authorized industrial distributor for Bulletin P-5. Or write us.

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FACTORY | NEW FILMS

A Dawn's Early Light shows scenes from Atomic Energy Commission plants in Idaho and Pittsburgh. Includes scenes of the construction of the nuclear power plant for the first atomic submarine, U.S.S. *Nautilus*. Points out the various peacetime uses to which atomic energy can be put in the future, such as in food preservation, medicine, industry, agriculture, and so on. Sound, color and black and white, 30 min. Available for loan or purchase from:

Westinghouse Electric Corp., P.O. Box 2278, Pittsburgh 30.

Wishes on Wheels portrays the industrial production methods that are the basis of the construction of today's automobile. It takes the viewer through one manufacturing plant, following an order through the feeder lines, then down the main assembly lines. Shows how the Telautograph system flashes essential information to every point of the line and the use of various automatic devices. Points out difference between modern line and old-type mass production. Color, sound, 27 min. For free loan, write:

Modern Talking Picture Service, 45 Rockefeller Plaza, New York.

Work or Wages Guaranteed explains the terms asked by the United Automobile Workers prior to the settlement of their contract in June of this year. It outlines the background and principles behind the GAW plan for 100% pay during layoff periods. Presents—from the union viewpoint—a mock collective bargaining session with management vs. union. Color and black and white, sound, 18 min. Available for rent (color, $15; b/w, $7.50), or for purchase from:

Contemporary Films, 13 East 13th St., New York City.

Pump Trouble is an animated cartoon film on heart disease. Shows how heart disease can only be correctly diagnosed as such by a physician. Points out that other ailments have similar symptoms—and can be aggravated by apprehension as to the possible cause. Corrects various misconceptions about fatal aspects of heart disease. Color, 13 min. Available from:

American Heart Assn., 44 East 23rd St., New York 10.

Something to Live By is a supervisory training film—for first-line and middle supervision. Explains the function of the union contract in labor-management relations. It outlines and interprets the contract, then suggests how its provisions can best be applied. Sound slidefilm, color, 15 min. For free loan, write:

Studebaker Corp., South Bend, Indiana.

1955 U.S. Government Catalog of 16mm sound motion pictures and 35mm filmstrips lists and describes about 3000 films and filmstrips of government departments and agencies. For use in educational and industrial training programs, these films are available for purchase from United World Films. For copy of catalog, write:

United World Films, Inc., 1445 Park Ave., New York 29.

Selected Motion Pictures 1955-56 is a 56-page catalog listing over 1000 16mm sound motion pictures in the fields of industry and education. About 200 of these are available on a free-loan basis for group showing. For copy of catalog, write:

Association Films, Inc., 347 Madison Ave., New York 17.

SAFETY

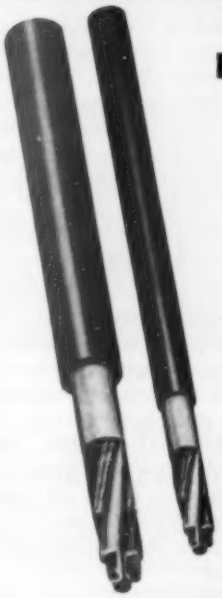
The following films are listed as a supplement to the article, "Safest Folks in Town," starting on p. 114.

One to a Customer depicts the use of employee personal protective equipment. Illustrates many different types of equipment for both men and women, and specific use for each. Black and white, 11 min. For free loan, write:

Aetna Life Affiliated Companies, Public Education Department, Hartford 15, Conn.

Turn the page

The inherent toughness of a properly made flexible cord is your best assurance of long life. The all-resistant Neoprene sheath protects Rome 50 Cords against operating hazards.



Measure the costs of cord failure

Every time a flexible cord fails on the job, it costs you money—(1) money lost through job delay—down time—and (2) the expense of replacement.

If you use flexible cords frequently and use them hard, your best insurance against trouble is a durable Neoprene sheathed Rome 50 Cord. Correct design makes Rome 50 Cords flexible and easy to handle. And the inherent resistance to moisture, abrasion, oils, acids, flame and sunlight of the tough Neoprene sheath gives you the long cord life you need.

Rome 50 Flexible Cords are available in Types SO and SJO—economically priced.

Where service is unusually tough, it will pay you to check into the savings you can make with the extra heavy-duty cords and cables in the slightly higher priced Rome 60® line.

Contact your Rome distributor for service—Rome 50 for all around use—Rome 60 for extra heavy duty.

Moisture and abrasion won't hurt tough Neoprene sheathed Rome 50 Cords. And a Rome 50 Cord is flexible, easy to handle.

TYPE "SO"—600 VOLTS						TYPE "SJO" FLEXIBLE—300 VOLTS						TYPE "SJO" EXTRA FLEXIBLE—300 VOLTS					
		TWO CONDUCTOR		THREE CONDUCTOR				TWO CONDUCTOR		THREE CONDUCTOR				TWO CONDUCTOR		THREE CONDUCTOR	
SIZE A.W.G.	STRANDING	Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'	SIZE A.W.G.	STRANDING	Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'	SIZE A.W.G.	STRANDING	Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	42/34	.40	95 lbs.	.41	105 lbs.	18	16/30	.30	53 lbs.	.33	70 lbs.	18	42/34	.30	50 lbs.	.33	70 lbs.
16	67/34	.41	100 lbs.	.43	120 lbs.	16	26/30	.33	63 lbs.	.36	86 lbs.	16	67/34	.33	61 lbs.	.36	86 lbs.
14	41/30	.53	160 lbs.	.56	200 lbs.												
12	65/30	.60	215 lbs.	.64	260 lbs.												
10	105/30	.64	250 lbs.	.69	325 lbs.												

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

PYROSIL...outstanding manufacturer of
QUARTZ PIPE
"FUSED SILICA"
FOR ALL PURPOSES
welding ring inserts • chemical plants • high temperature furnaces • refineries dryers • heat exchangers
ANY SIZE OR ORDER FOR YOUR SPECIAL NEEDS AND APPLICATIONS
QUARTZ ELECTRIC IMMERSION HEATER
for every application
*FAR-INFRARED RADIANT HEAT LAMPS
Uniform infrared heat for baking, drying, curing or dehydrating process.
*Duo-style reflectors
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CUYAHOGA FALLS, OHIO

GRATING
Open steel flooring; welded or riveted pattern; fabricated in carbon or stainless steel, aluminum, monel and alloys.
when you specify KLEMP You Eliminate Maintenance Costs and Assure Worker Safety!
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A steel floor armor designed to prolong the life of floors 5 times! Installed in concrete or mastic on new or existing concrete or wood floors
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Kindly send me a copy of your "Data and Specification Manual."
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Phone

Begins on page 308

Supervising for Safety is a series of three films: *Fragile—Handle Feelings With Care, Call 'em on the Carpet, It's an Order.* Shows supervisors and foremen how to get workers to successfully cooperate with plant safety rules. Each film deals with a specific angle of safety supervision. 16mm sound motion or 35mm sound slidefilm, black and white, 12 min. each. Available as set for rent or purchase from:

National Safety Council, 425 N. Michigan Ave., Chicago 11.

Safety Saves is directed at industrial truck drivers. Covers driver training and safety practices as applied to fork-lift trucks and towing tractors. 16mm, sound, black and white, 25 min. For free loan, write:

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

You Can Take It With You shows the plant worker how to avoid accidents in his home. Points out safety tips on housekeeping, electricity, ladders, lifting, and home repairs. 16mm, sound, color or black and white, 13 min. For rent or purchase, write:

National Safety Council, 425 N. Michigan Ave., Chicago 11.

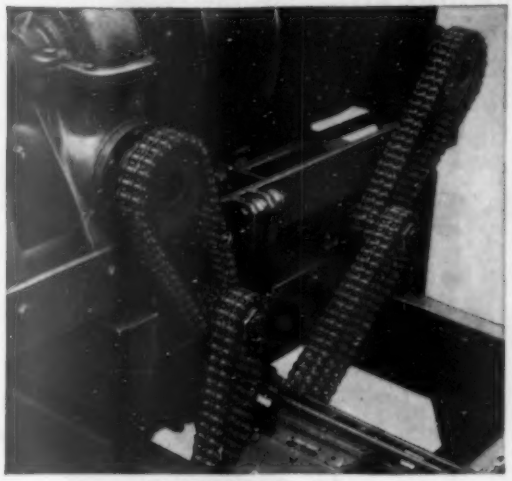
Stay Alert—Stay Alive depicts one plant's safety plan that is typical of many others throughout industry. Demonstrates the behind-the-scenes work that is steadily decreasing the country's industrial accident toll. 16mm, sound, black and white, 12 min. Available for free loan from:

Aetna Life Affiliated Companies, Public Education Department, Hartford 15, Conn.

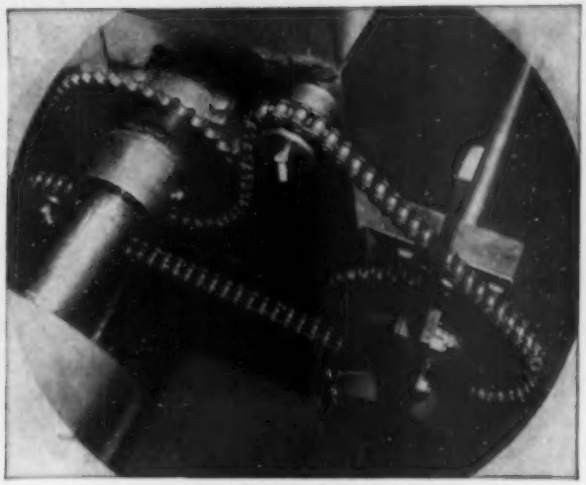
Plan to Live takes you through the operations of a chemical plant and points out the many safety practices being observed. Shows how responsibility for safety falls on everyone in the building, and how failure to observe the smallest precaution endangers individuals, plant personnel, and the community as a whole. 16mm, sound, black and white, 17 min. For rent ($4), write:

Indiana University, Audio-Visual Center, Bloomington, Ind.

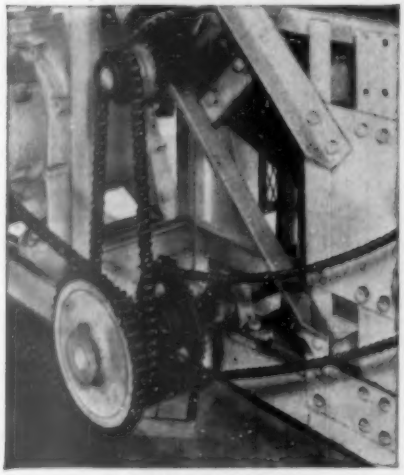
Select DIAMOND (FROM STOCK) for drives like these



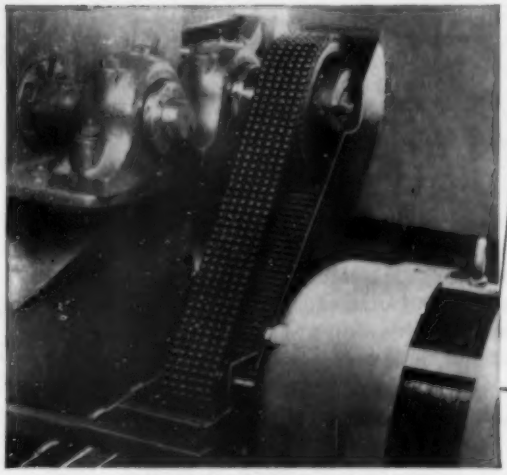
One Shaft to Another
Both Revolve Same Direction



One Shaft to Another
Shafts Operate in Opposite Directions



One Shaft to Several



High Speed Motor Drive

ALWAYS PRELOADED

For many, many years, Diamond Chain has been preloaded after assembly for the purpose of bringing pin-bushing seating into stabilized relationship prior to field installation.

Always Economical, and Constant Speed Ratio

Not only flexible in application, but economical as well, Diamond Roller Chains maintain constant speed ratio and high (98-99%) efficiency.

Drive requirements can be met quickly because of the greatly increased range of STOCK Chains and Sprockets now available.

Whether the drive center distances are short or long; speeds high, low, or medium; Diamond Roller Chains will do the job. And power transfer, in large or small amounts, presents no problem. New Catalog 754 covering *stock* Chains and Sprockets will help you to correct selection.

DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

Dept. 449, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

The Roller Chain **is DIAMOND**

TRADE ◇® MARK

MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

Here's a sealed heavy duty limit switch to use where the going is ROUGH!

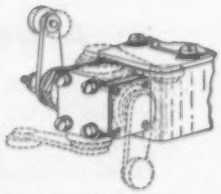
Unaffected by dust, dirt, abrasives or splash of liquids

• Plant engineers who are looking for a rugged sealed switch to use as an interlock, safety or limit switch will find this MICRO SWITCH unit can meet some mighty difficult requirements. This switch is available in either SPDT or 2-circuit switching arrangements.

The entire switch assembly, including the switching element and the actuating head, is completely sealed from the effects of dust, dirt, water or any other harmful agent that might cause wear, clogging or corrosion. Continual vibration and shock have no effect on this switch. It operates smoothly and efficiently through such temperature extremes as –20° F. to 150° F.

This is but one of hundreds of MICRO SWITCH switch types which have proved valuable to plant operating men in the rehabilitation of present plant equipment—making it safer, more automatic and more productive.

There is a MICRO SWITCH *distributor near you with complete stocks of switches to meet your needs. Look under "Switches, Electric" in the Yellow Pages.*



This MICRO SWITCH heavy duty limit switch is one of the most versatile switches ever developed. It can be mounted in almost any position in relation to the means of actuation. The operating head is easily adjustable to any of four positions and the roller arm can be reversed on the head and adjusted to any one of 870 positive lock positions. It is field adjustable for operation clockwise, counter-clockwise, or both.

A complete line of snap-action and mercury switches

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

what if you could hire Paul Bunyan to dip your plant in "liquid aluminum?"

(most of your maintenance problems would be gone!)

Good aluminum paint actually puts a *protective shield* on rustable metal and masonry surfaces. It resists corrosion from fumes and smoke; seals against moisture and rust; reflects light and heat—makes everything brighter; evaporation of volatiles is reduced; heat expansion is held to a minimum.

Alas, Paul Bunyan is not for hire. But...

IT'S JUST ABOUT THAT EASY!
ONE COAT of Aluminum Paint LASTS and LASTS

Labor—the largest cost in painting—is low because only one coat of aluminum paint is needed in most cases. Here, then is a way to slash your plant maintenance costs without sacrificing protection.

Reynolds Metals Company does not make aluminum paint. But if you would like the names of manufacturers who rely on the high quality of genuine Reynolds Aluminum Pigments, we'll gladly send you the list. Just use the coupon below.

THAT GOES FOR ROOFS TOO!
Buy Aluminum Roof Paints and Coatings with this Warranty Seal

They protect rustable metal and built-up roofs, add years to roof life and keep interiors cooler in summer. Increase employee efficiency, cut cooling costs. Insist on Asphalt-Aluminum roof paint or coating with this Warranty Seal. It assures you of an approved vehicle and at least two full pounds of pure aluminum metal pigment in every gallon.

Reynolds Metals Company
P. O. Box 1800-PJ, Louisville 1, Kentucky

Please send information on Aluminum Paints and Roof Coatings.

☐ Send list of aluminum paint manufacturers
☐ Send list of asphalt-aluminum roof coating manufacturers

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Company .....

Address .....

City ..... Zone ..... State .....

This advertisement appears in the interest of the Paint Industry of America

If you haven't read this important booklet, your production line may be operating at less than peak efficiency. Your operations may be beating competition with HSS today, but you will likely need carbide tooling to be the leader tomorrow.

Write for your free copy of this important booklet today!

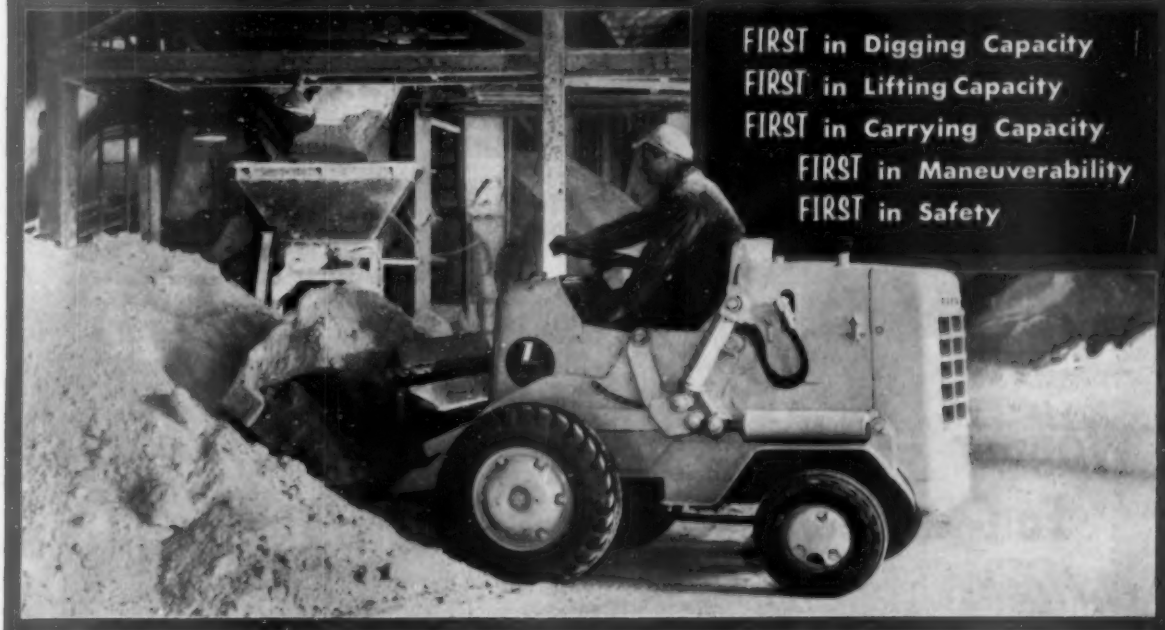
Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.

FIRST in Performance because it's FIRST in Design

New Model HA PAYLOADER® Tractor Shovel

with 40 degree bucket tip-back and powerful break-out action



FIRST in Digging Capacity
FIRST in Lifting Capacity
FIRST in Carrying Capacity
FIRST in Maneuverability
FIRST in Safety

The 1955 Model HA "PAYOADER" has gone to work in all kinds of manufacturing and processing plants and has already proven that it is a production champion. It has an 18 cu. ft. bucket — the biggest capacity in its class — and an amazing new bucket action. Long-time "PAYLOADER" users as well as new owners report new highs in production and new lows in bulk-material handling costs with the new HA.

They praise the 40 degree bucket tip-back at ground level that digs heaped bucket loads easily — up to a ton in weight — and carries them close and low for fast, safe transport without spillage. They like the increased power, the ease and speed of operation that comes from torque converter drive, easy steering and powerful hydraulic brakes.

Your PAYLOADER Distributor is ready to show what the new HA can do on *your* bulk-material handling work.

☐ Send data on Model HA (18 cu. ft. bucket capacity)
☐ On larger 2-wheel drive models
☐ On larger 4-wheel drive models
☐ On "PAYLOADER" towing tractors

Name .....
Title .....
Company .....
Street .....
City .....
State .....
FM.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY INTERNATIONAL HARVESTER COMPANY

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

New NEMA Frames
Standard and Explosion-proof

Type EP
215 Frame

Wagner Totally-Enclosed Fan-Cooled Motors

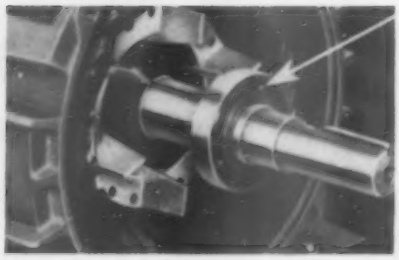
cut maintenance time and costs

Check the features of the new *Wagner Type EP Totally Enclosed Motor*. They spell the difference between needless expenditures in maintenance time and costs . . . and a definite savings in motor upkeep and repairs. You'll find that for general industrial use where dust, dirt, filings, abrasives, steel chips or moisture are present, the Wagner Type EP Motor gives steady, troublefree performance and longer service life.

Wagner Type JP Explosion-Proof Motor . . . has the same quality construction as the Type EP – plus added features which make it completely safe to operate where explosive dust, gases or vapors are present.

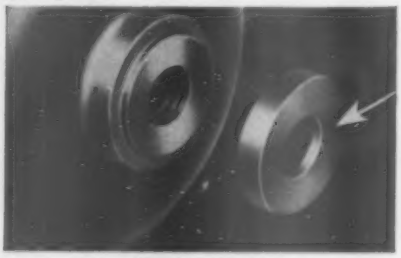
Both Type EP and JP Wagner motors are available in ratings up to 250 horsepower. For complete information, just call the nearest of our 32 branch offices, or write for Bulletin MU-203.

Wagner Electric Corporation
6412 Plymouth Ave., St. Louis 14, Mo.



1 HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity provide long, troublefree service.

2 BEARINGS CAN BE RE-LUBRICATED—Wagner motors can be re-lubricated when necessary to prolong bearing life.



3 BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals, a machined collar mounted on the motor shaft.

4 EASY TO CONNECT—Large diagonally-split conduit box provides ample room for making connections. Leads are permanently identified.

5 NO GREASE LOSS—Bearing housings have effective seals to prevent escape of grease.

6 RIBBED FRAME—Ribs on the corrosion-resistant cast iron frames add mechanical strength and increase the surface area for more efficient cooling.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

M55-10

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

TAPED BOXES

ARE BEST

You get even corners for good stacking . . . greater safety for the handler . . . better sealing against dirt and dust . . . no damage to merchandise — a hazard from other methods of closing. Yes, taped boxes are best — and best of *all* when made with non-asphaltic, glass reenforced LOKABOX, strongest of them all — or SISAL TAPE, standard of the industry.

AMERICAN SISALKRAFT CORPORATION, ATTLEBORO, MASS., CHICAGO 6, NEW YORK 17, SAN FRANCISCO 5

To meet today's trend in designing buildings of ALL classes —

Bayley

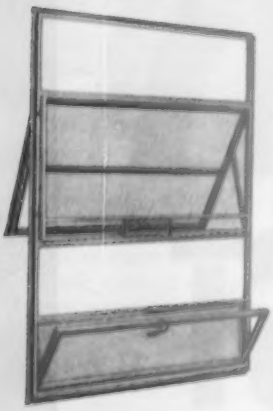
Curtain Wall Systems

1930

Worcester Pressed Steel Co., Worcester, Mass. Archt. — J. D. Leland Co., Boston, Mass. Bldrs.—Horty & Brown, Boston, Mass.

We invite you to take full advantage of our 30 years of experience in designing and building WINDOW CURTAIN WALLS

Think of it! Many Bayley engineers are *lifetime specialists* in curtain-wall window construction! For Bayley's 76 years of progress in metal fabricating and window making includes 30 years in the design and production of *window curtain-walls!* And Bayley protects your confidence with a record for quality production, thorough pre-engineering and follow-through services, integrity, and financial soundness (ask those who have dealt with Bayley). When you want to be sure, be *sure* it's Bayley.

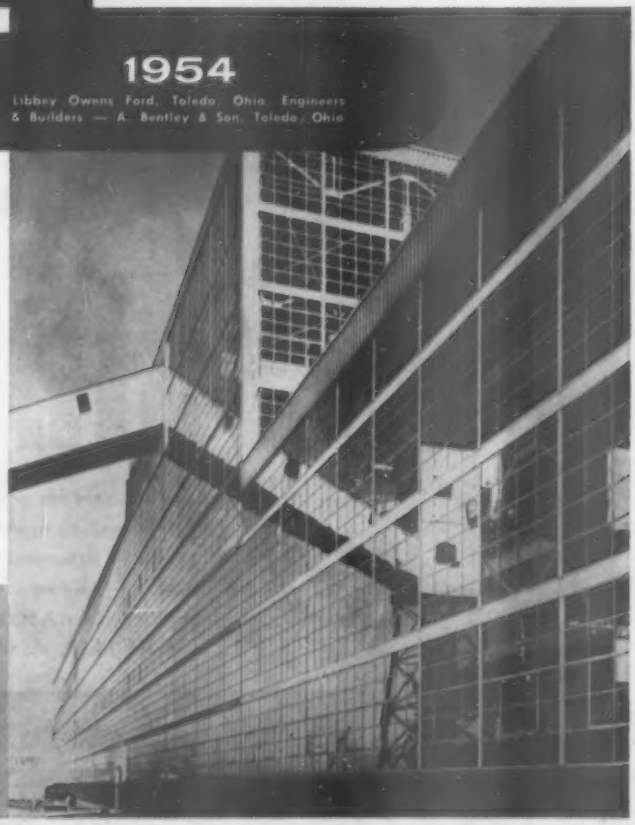


The Bayley Intermediate Projected Window (steel or aluminum) is the basic element in Series 150 Curtain Wall Systems. It is also built into separate prefabricated panels composed of deep-sectioned framing members in the 450 Series. This permits wide flexibility in combining any of the newer wall-panel materials and design trends with both fixed and ventilating window areas, to meet any need for light, air, vision, and beauty.

See Bayley in Sweet's. Complete catalogs on aluminum windows, 16a/Bay; steel windows, 16b/Ba.

1954

Libbey Owens Ford, Toledo, Ohio. Engineers & Builders — A. Bentley & Son, Toledo, Ohio



76 *Years of* RELIABILITY

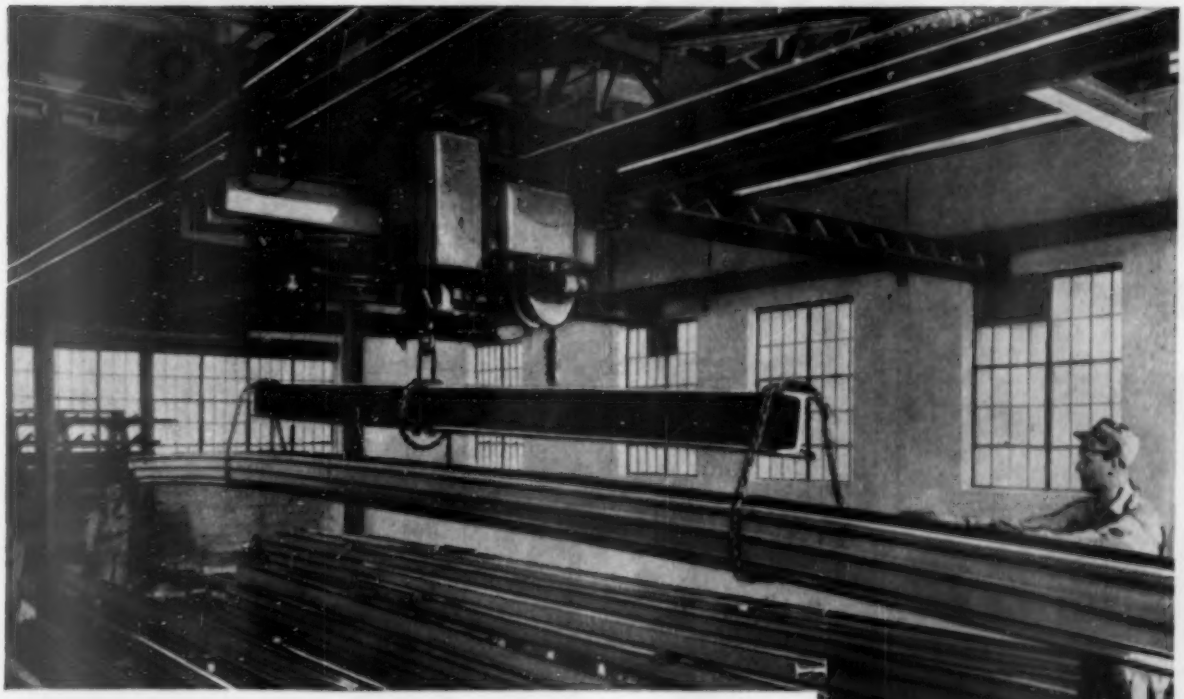
The WILLIAM BAYLEY Co.

Springfield, Ohio

District Sales Offices:

Springfield • Chicago 2 • New York 17 • Washington 16

Agents in All Principal Cities



Potentially, it's the best

And Louden has the equipment, the experience and the engineering to turn its advantages to greatest account

For many types of materials in many kinds of plants, overhead handling does indeed offer inherent advantages over other methods of handling. And Louden engineering, experience and range of equipment turn these advantages to greatest account. The Union Iron & Steel Company, Inc., shows how. Largest independent in Cincinnati, Union warehouses steel bars, plates and sheets to be cut and shipped to order. Union *had* overhead handling before, a crane that unloaded stock from freight cars and transferred its load roundabout to one of 4 parallel monorail tracks. But this resulted in slow handling and "dead" spots in storage.

Louden proposed an unusual installation with crane operating in the diagonal position to conform to the angle of the railroad siding at the rear of the building. This direct, flexible, straight-line handling would give inch by inch coverage of the storage area. Louden equipment was installed and it reduced unloading time from 4 hours for a 50-ton car to 50 minutes—a ton a minute. With every foot of space utilizable, Union gained 25% in storage capacity. Handling of stock to cutting machines was greatly expedited as well.

The difference lies in engineering concept. Louden's long experience gives a resourcefulness and flexibility of approach, an ability to deliver *better* handling to you. Your plans *should* include a consultation with Louden experts.

THE LOUDEN MACHINERY COMPANY
5410 Broadway, Fairfield, Iowa
A Subsidiary of Mechanical Handling Systems, Inc.

Louden 5-ton crane operates in diagonal conforming to the angle of rear of building. Unlimited lengthwise and crosswise travel.

Crane and magnet lift 5-ton plate for shape-cutting.

Louden crane transfers 5 tons of angle iron to cutting machine.

Louden

MONORAIL & CRANES

SINCE 1867...THE FIRST NAME IN MATERIALS HANDLING

New! Louden Shakpruf Electrification for all monorail and crane installations. Hazards of open conductor bars now completely overcome by this exclusive Louden engineering development. Write for full details of this safe conductor system.

An Evolution in Eye Protection!

Whether your Safety Director comes to you . . . or you Suggest it to your Safety Director by all means look into American Optical Company's

New "Ultrascopic Vision"

METAL AND PLASTIC SAFETY GLASSES FEATURING

You will reduce the high cost of Eye Accidents

American Optical
SAFETY PRODUCTS DIVISION

Always insist on Trademarked Lenses and Frames
†T.M. REG. BY AMERICAN OPTICAL COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

REEL SAVINGS FOR YOUR PLANT

WAYNE *Production-Booster* HOSE REELS

STOPS PROFIT ROBBING ACCIDENTS—No suspension cables or coils of loose hose to trip over. Operator reels out only hose length needed, releases it like a window shade for automatic rewind.

ELIMINATES WASTE MOTION—Air supply and tool suspension are combined. Air tool is within easy reach at all times. Wayne Production-Booster Hose Reels increase output, reduce assembly costs, lessen worker fatigue.

SAVES HOSE . . . PROLONGS LIFE—Hose is always reeled up . . . cannot be walked on, crushed by industrial trucks. Hose lasts longer . . . maintenance and replacement costs lower.

EASILY INSTALLED in any position. Hose lengths 15′ to 50′.

THE WAYNE PUMP COMPANY
Industrial Division • FORT WAYNE, INDIANA
SALISBURY, MARYLAND • TORONTO, CANADA

Wayne
Industrial Products

AIR COMPRESSORS

LIFTS

LUBRICANT DISPENSERS

INDUSTRIAL PUMPS

INVADER PUMPS

HELP NEEDED fast as floods sweep through industrial plants in six northeastern states. Production halts, machines are buried under mud and debris, electric power is off.

Help...without a

When the flood waters of rampaging rivers left their trail of debris and destruction in New England, it seemed that industry had suffered a knockout blow. Plants would have to be cleaned up fast . . . or men would be idle—machinery would rust—and the whole country would suffer production tie-ups.

The editors of FACTORY knew that most of the plant operating men in the area lacked experience in flood clean-up. How could these men be helped . . . in a hurry?

Following a fast Monday morning conference, editors Carroll Boyce and Walt Wagner flew to Kansas City to collect data from veterans of the 1951 flood. By working through the night and all day Tuesday they were able to phone their reports in that evening for rewrite by editors Murphy and Stanbury . . . and complete their writeups on the flight back to New York. Wednesday morning—41 sleepless hours later—their copy went to the printer.

Meanwhile, editor Les Bittel, veteran of a flood mop-up deal, tapped his brains to bang out a 28-item "do's and don'ts" piece . . . Carl Wyder cut short his vacation to contribute his plant know-how . . . "Stan" Stanbury and Lew Urquhart dug up and abstracted material pertinent to flood conditions . . . and Bob Rice compiled a detailed flood-damage check list.

The Circulation Department stenciled envelopes for FACTORY subscribers in the affected areas . . . Office Service prepared letters for manufacturers' associations, civil defense and government officials, newspapers and radio stations. Editors and office personnel willingly worked till midnight collating and preparing the report for the mail.

Four working days later—on Thursday afternoon—the 32-page Emergency Flood Bulletin was in the mail. Alerted Post Office workers got the

McGRAW-HILL FOR BUSINESS

HELP GIVEN by men who know. FACTORY editors fly into Kansas City, quiz plant men there about recovery after big floods four years ago.

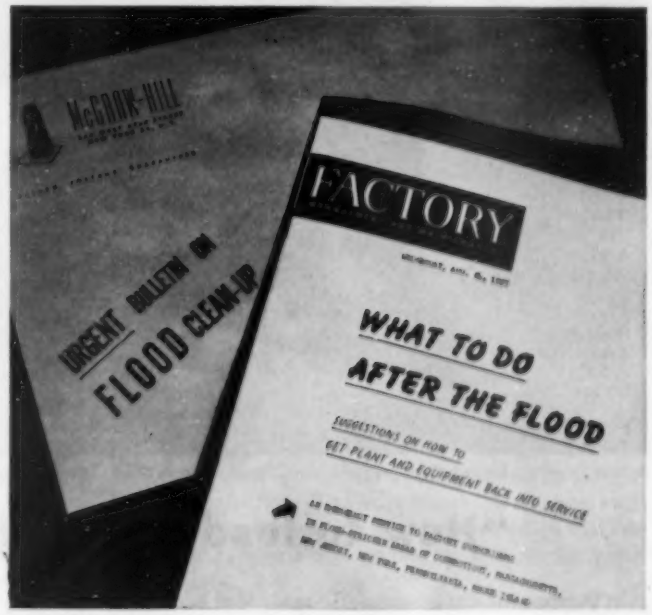
HELP READY in FACTORY's New York offices. Everybody pitches in to assemble know-how from all sources, print it, speed it to FACTORY subscribers and disaster agencies in the stricken areas.

price tag

mail through and, on Friday morning, telegrams and phone calls came in asking for more copies . . . resulting in a second and third printing.

There was no price tag on the bulletin. It offered the kind of information that a group of hard-pressed plant operating men needed quickly, and in more detail than could be reported in editorial pages. And those who did the job feel amply repaid in the many expressions of gratitude they have received from the recipients.

In experience . . . in knowledge of their jobs . . . in ability to serve their readers, FACTORY's editors are typical of those serving other McGraw-Hill publications. They're specialists. They know their fields. They live with the problems of the men—within these fields—who look to them for help with their jobs. That is why every McGraw-Hill publication provides and maintains an alert, interested audience for the advertisers' sales messages.



HELP DELIVERED. This 32-page flood emergency bulletin reached plant executives in the flooded areas August 26. It told them what to do to get their plants to work again.

McGRAW-HILL
PUBLISHING COMPANY, INCORPORATED
330 WEST 42nd STREET, NEW YORK 36, N. Y.
OVER A MILLION MEN IN BUSINESS AND INDUSTRY PAY TO READ McGRAW-HILL BUSINESS PUBLICATIONS

Sylvan Geismar, Executive Vice-President of the Manhattan Shirt Company, tells you

"How to lose your shirt on the road!"

"On October 4th, our salesmen take to the road in the annual race for Spring orders. And it's a tough race. If every sample isn't up-to-the-minute in style, we can lose our shirt!

"But we keep our Manhattan and Lady Manhattan salesmen out in front – with Air Express!

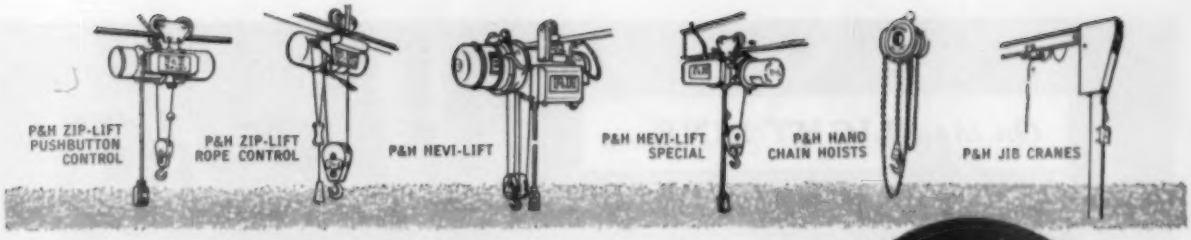
"As trends unfold, we deliver the newest shirt-styles to our men in a few hours. When hot items sell out, we fill buyers' re-orders just as fast! Air Express is indispensable in maintaining our leadership with our retail accounts.

"Yet we save money on most of our Air Express shipments! A 15-lb. shipment from New York to Milwaukee, Wisc., for instance, costs $5.15. That's the lowest-priced complete service by $1.85!"

Air Express

GETS THERE FIRST via U.S. Scheduled Airlines

CALL AIR EXPRESS . . . division of RAILWAY EXPRESS AGENCY



New...

P&H Hoist Rectifier Brake

...saves money by eliminating linkage and simplifying adjustment problems

P&H Hoist engineers built three basic improvements into this new rectifier brake: (1) They eliminated linkage — so there are less parts to suffer wear. (2) They simplified the adjustment operation so that it can be performed by a single turn of a collar on a threaded hub. (3) They reduced the armature stroke and shifted the brake contact from the magnetic core to the outer rim of the brake pot — eliminates peening the core metal.

Old-style brakes slapped back with an armature stroke of as much as ½" or even ⅞". On the new P&H rectifier brake, the stroke is only .030" to .035".

Instead of linkage, four springs compress the revolving and stationary discs when the motor is deenergized. The adjustment collar is notched to engage a spring-loaded catch which holds any given setting. The single adjustment can be made quickly and easily.

These three basic changes add up to time and money saved in maintenance. A test model of a hoist using this new brake ran for two years without one minute of maintenance time charged against it — and it's still going strong!

Sure we'll send one of our sales engineers to see you. He will give you complete information on the new P&H rectifier brake, and news of how you can adapt this feature to your present P&H equipment. Just use the handy coupon below.

Tear out and mail today!

P&H Hoists
HARNISCHFEGER CORPORATION
4525 West National Avenue, Milwaukee 46, Wisconsin

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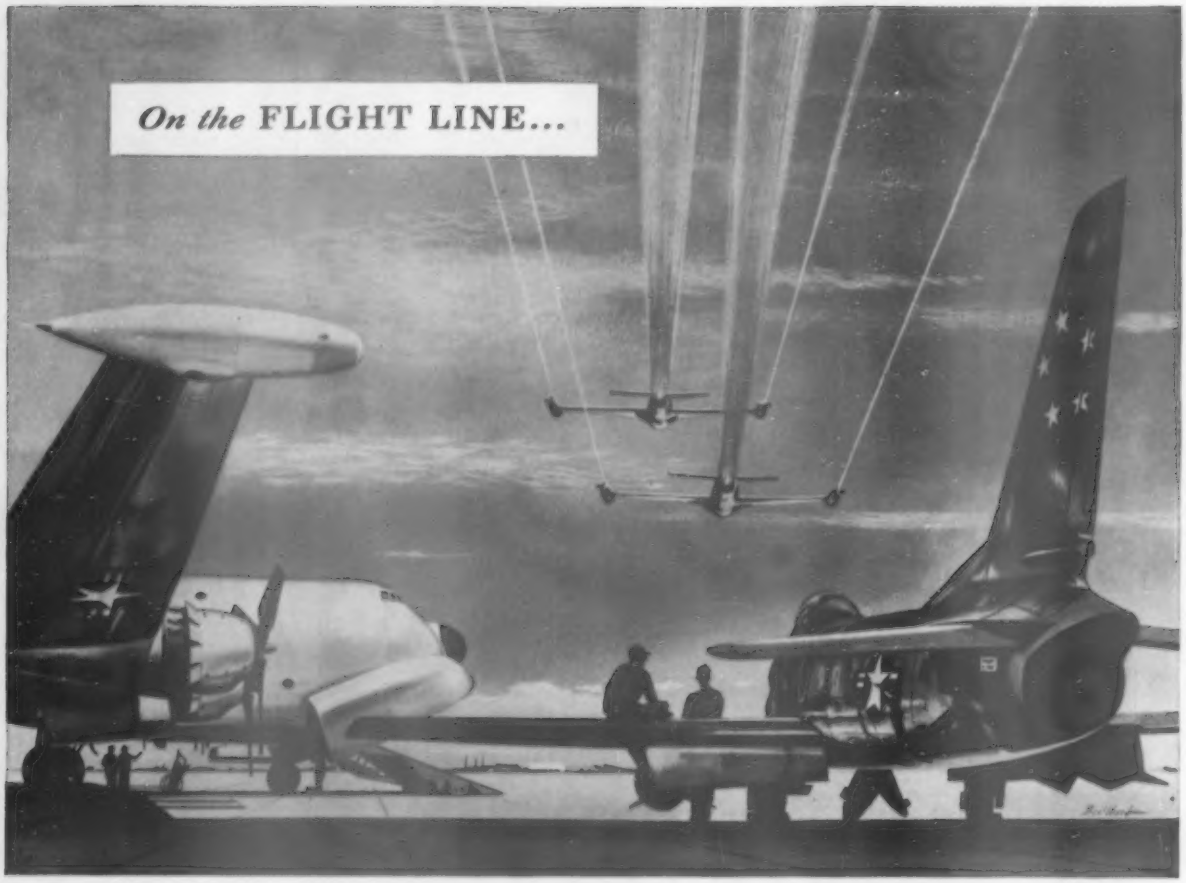

FIRST COST *can be the* LEAST COST

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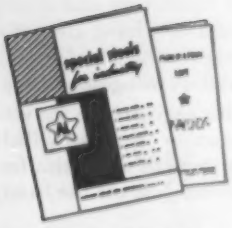

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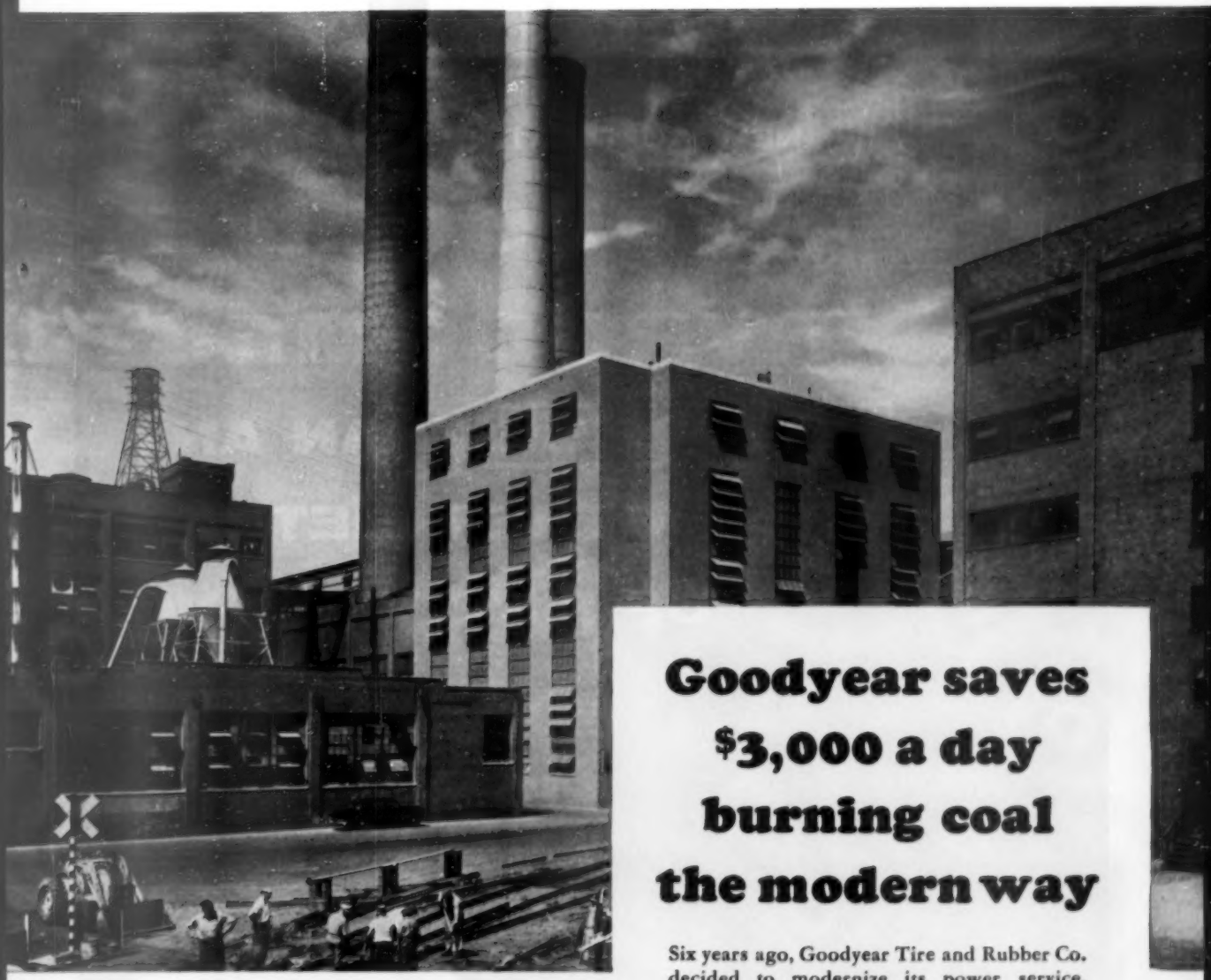

Goodyear saves $3,000 a day burning coal the modern way

Six years ago, Goodyear Tire and Rubber Co. decided to modernize its power service. Among other considerations, 70% of the firm's steam-generating equipment was over 30 years old. As a result, operating efficiency was only 65%. Power needs at Goodyear's Akron plants ran so much greater than capacity that additional power had to be purchased. Goodyear engineers and engineering consultants, Sargent & Lundy, were called in to study the problem and recommend a solution.

Now two 220,000 lb.-per-hr. boilers have replaced six 50,000 lb.-per-hr. units. Coal and ash handling are automatic. Controls are fully automatic. And not only have these and other changes resulted in dependable power service, but steam generating efficiency is now 82%—saving Goodyear $3,000 a day. For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

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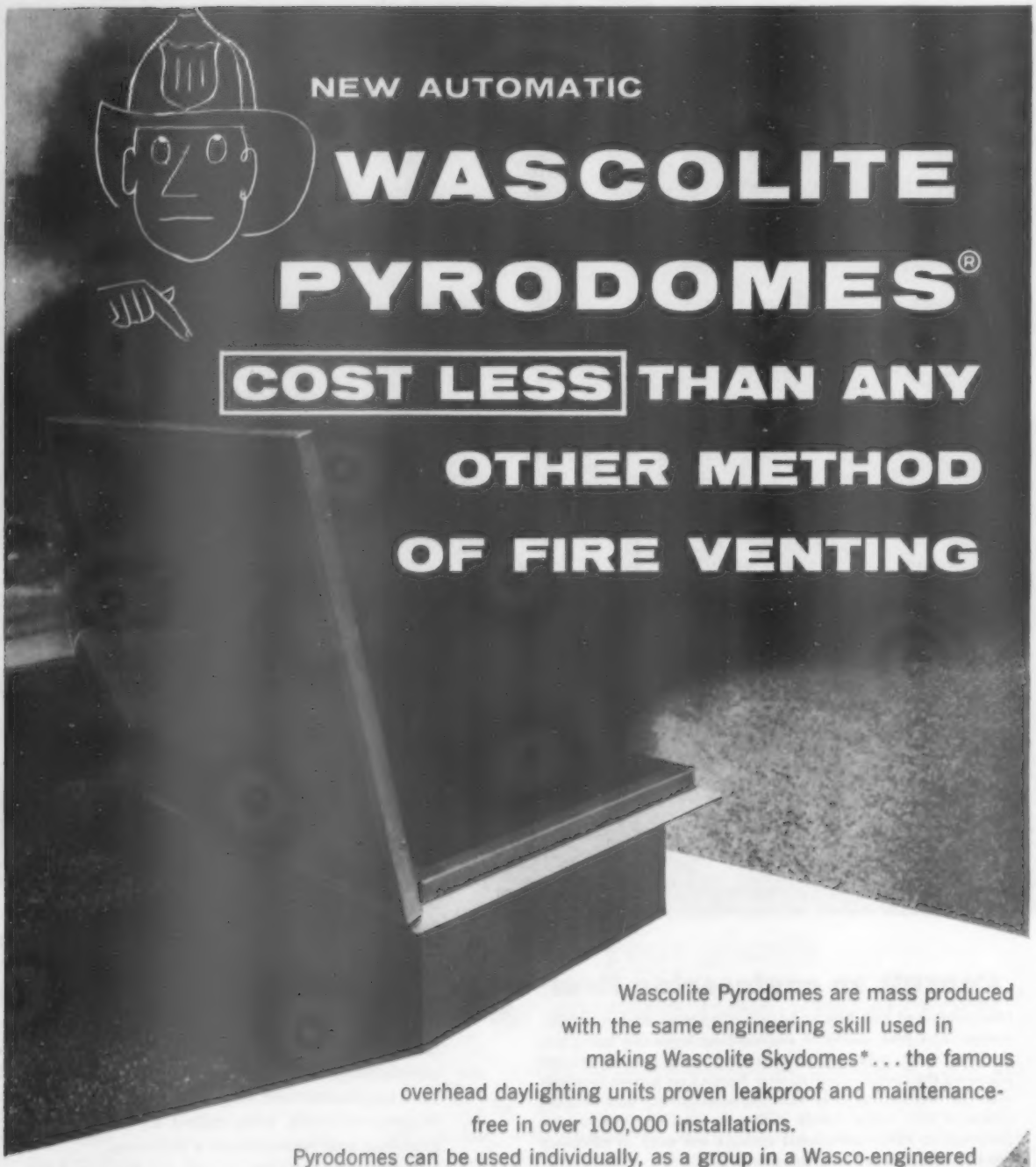
Southern Building, Washington 5, D.C.

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities —or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems result in a virtually labor-free plant • Coal is the safest fuel to store and use • No dust or smoke problems when coal is burned with modern equipment • In most industrial areas, bituminous coal is the lowest-cost fuel available • Between vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and it's price remaining stable.



Wascolite Pyrodomes are mass produced with the same engineering skill used in making Wascolite Skydomes*... the famous overhead daylighting units proven leakproof and maintenance-free in over 100,000 installations.

Pyrodomes can be used individually, as a group in a Wasco-engineered pattern, or as a series abutted in a continuous line as a firebreak.

Wascolite Pyrodomes confine fires to the smallest possible area . . . at less cost than any other method of fire venting.

*Wascolite Pyrodomes are made of the same high quality extruded aluminum and acrylic plastic.

For assistance in planning fire venting protection for your plant, write:
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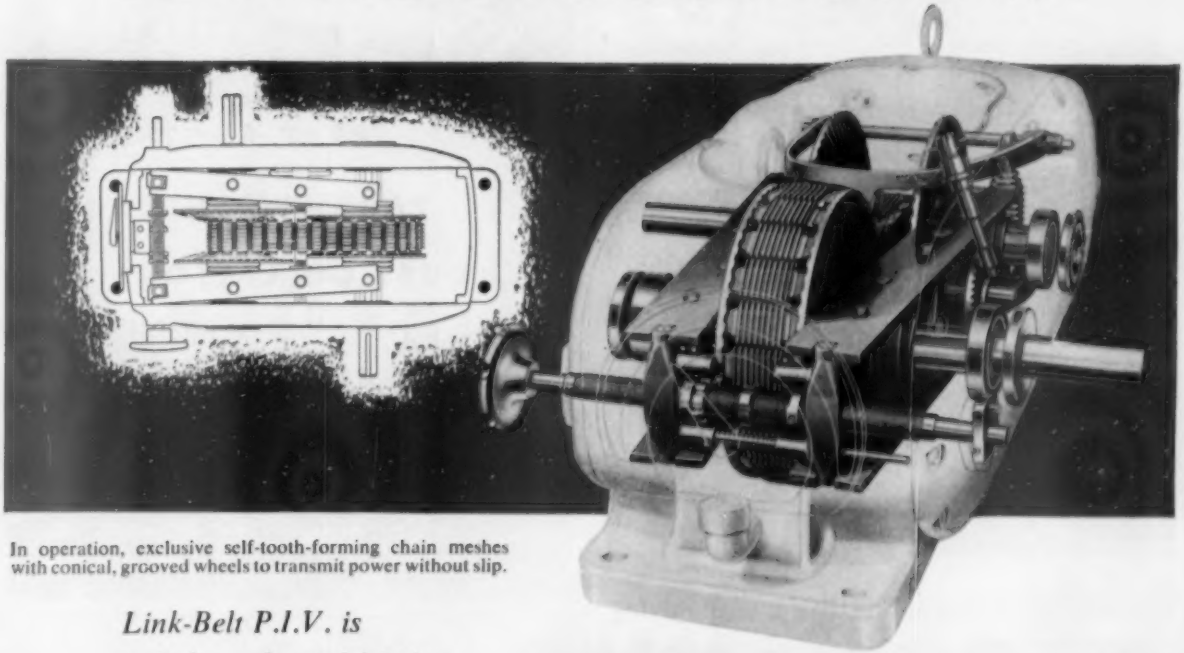


In operation, exclusive self-tooth-forming chain meshes with conical, grooved wheels to transmit power without slip.

Link-Belt P.I.V. is

- *independent of friction*
- *all metal*
- *fully enclosed*
- *automatically lubricated*

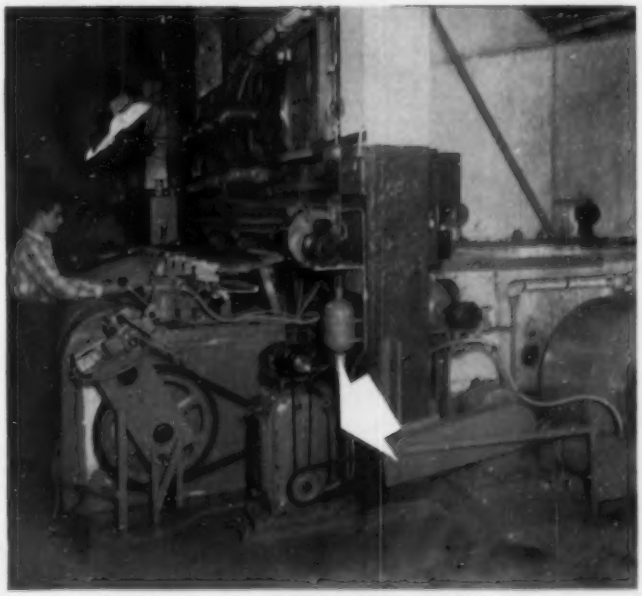
Here is the Positive, Infinitely Variable speed drive that's not dependent on friction for transmitting power. Instead, its exclusive drive chain with self-forming metal teeth engage with radial grooves in two pairs of cone-shaped wheels. Positive power transmission is assured at all speeds regardless of load.

Movement of the single control screw simultaneously varies effective diameters of wheels on input and output shafts. This makes possible an infinite number of stepless speed adjustments within the range of the drive. Speed of the output shaft can be changed instantly, even while operating under full load.

Link-Belt P.I.V. drives are available in capacities from ½ to 25 hp . . . in 8 sizes and 16 types for horizontal and vertical mounting. See your nearest Link-Belt office or authorized stock-carrying distributor, and write for Book 2274.

LINK-BELT

P.I.V. VARIABLE SPEED DRIVE



On jute slasher, Link-Belt P.I.V. Variable Speed Drive with electronic control automatically regulates the speed of winding ends onto the beam by control of the moisture content of the material and the accumulating diameter of the wound beam.

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Carrier knows heating

Carrier has fifty years of experience in "making" and controlling temperatures. Today Carrier offers a choice of steam and hot water unit heaters in various types and a wide range of sizes. All are of highly advanced design for the efficient distribution of heat in factories, warehouses, display rooms and the like.

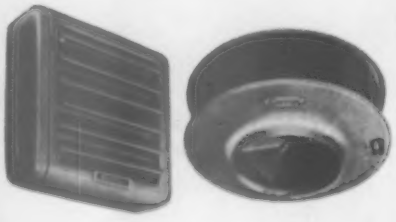
The Carrier 4-way Directed-flo Unit Heater

is the answer to the problem of heating large spaces. In contrast to conventional types of unit heaters, the directional-flo unit will heat three times the same area more economically and at a lower initial cost. Fewer heating elements are required. Less piping, valves and fittings are needed. The 4-way delivers quick heat downward from any or all four sides . . . as much or as little as wanted. Eight sizes—82,000 to 590,000 Btu/hr.

WRITE or USE COUPON for complete information

CARRIER Horizontal Air Discharge Unit Heater is powerful, smartly styled and quiet in operation. For retail shops, restaurants, garages, offices. Sizes 21,000 to 200,000 Btu/hr.

CARRIER Projection Type Unit Heater gives very efficient down-blow heat distribution, even from high ceiling installation. Choice of standard or low temperature rise coils. 30,000 to 576,000 Btu/hr.



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for Maintenance ENGINEERS

DO YOU KNOW THE MAXIMUM SAFE OPERATING TEMPERATURE FOR A V-BELT DRIVE?

A safe average is 140° F. If you have installations where V-Belts are subjected to higher temperatures, special heat-resistant belts are available. (Sales plug: If you have a transmission problem involving extreme temperatures or other special V-drives, Durkee-Atwood engineers and distributors are at your service).

HANDY TIPS ON V-BELTS AND V-DRIVES

See your D-A distributor or write Dept. FM-10 for catalog that includes conversion tables, engineering data, latest Rubber Manufacturers Association horsepower ratings, drive selections and helpful Do's and Don'ts of V-belt operation.

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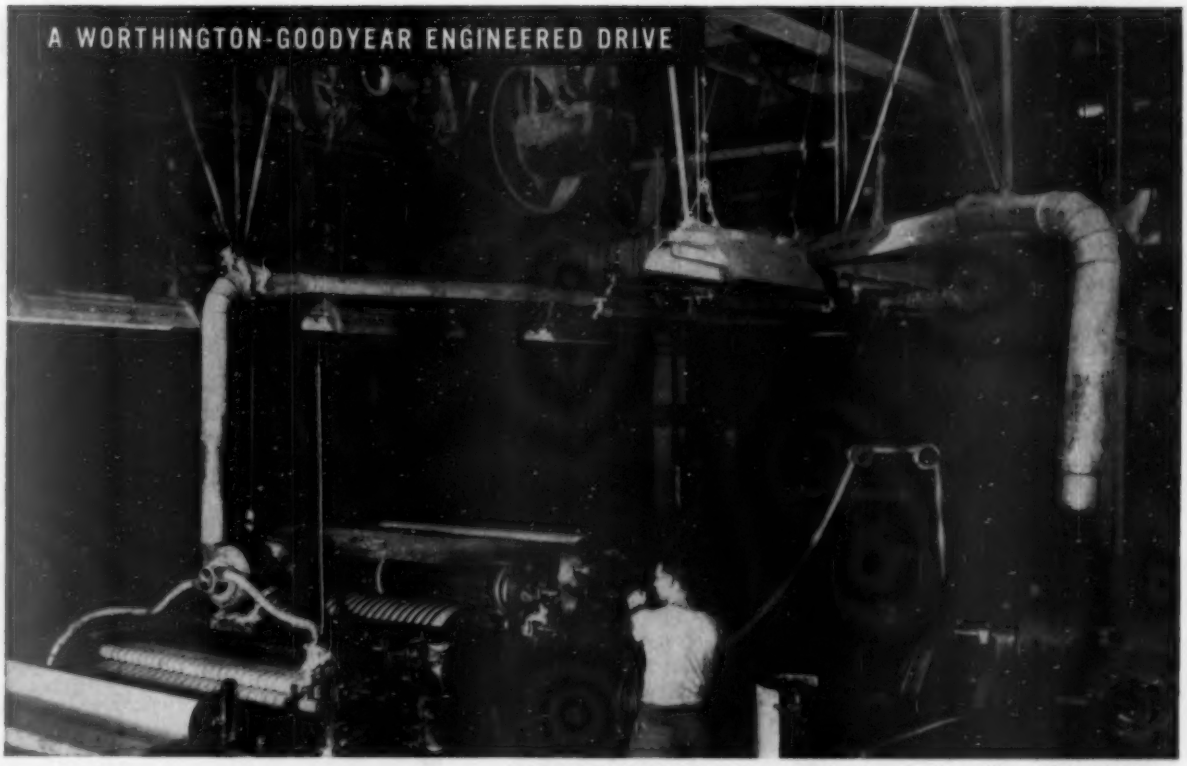
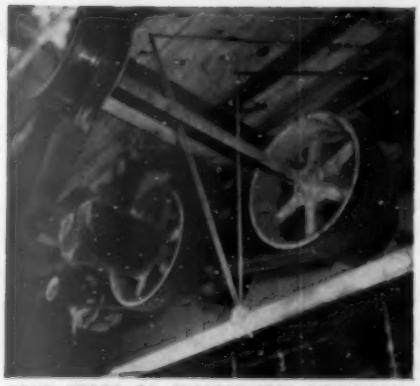
DURKEE ATWOOD V-BELTS



SMOOTH, NON-SLIP DRIVE is a must for these card machines of the Hardwick & Magee Company. Worthington Multi-V-Drive (overhead) does the job.

High torque without slippage or stretch

Worthington distributor solves unusual overhead drive problem



FOUR YEARS OF TROUBLE-FREE OPERATION. That's what Hardwick & Magee like about their efficient Worthington Multi-V-Drive.

How to get a drive that would withstand high torque without slipping? That was the problem faced by the Hardwick & Magee Company, Philadelphia manufacturers of carpets and rugs.

Hardwick & Magee Company needed a dual drive for their cards, made up of a drive from the motor to a jack shaft, and a drive from the jack shaft to a line shaft. The problem was with the second drive, which had very limited take-up and consequently needed a drive having very low stretch and requiring practically zero take-up.

After consulting Industrial Transmission Machinery, Worthington distributors in the Philadelphia area, Hardwick & Magee Co., decided that this was definitely a job for Worthington QD Sheaves and Goodyear Steel Cable belts because:
1. The tapered, split QD hub would allow no pulley slippage on the shafts, and
2. The Goodyear Steel Cable V-Belts would carry the high load with practically no stretch, thus fulfilling the requirements of a drive with limited take-up.

As it turned out, Hardwick & Magee couldn't have made a better drive choice. The Worthington-Goodyear drive combination has proven itself through four years of trouble-free operation.

Find out how this Worthington-Goodyear team work can pay off for you, too. Write for Bulletin V-1400-B7G to Worthington Corporation, Harrison, N. J.

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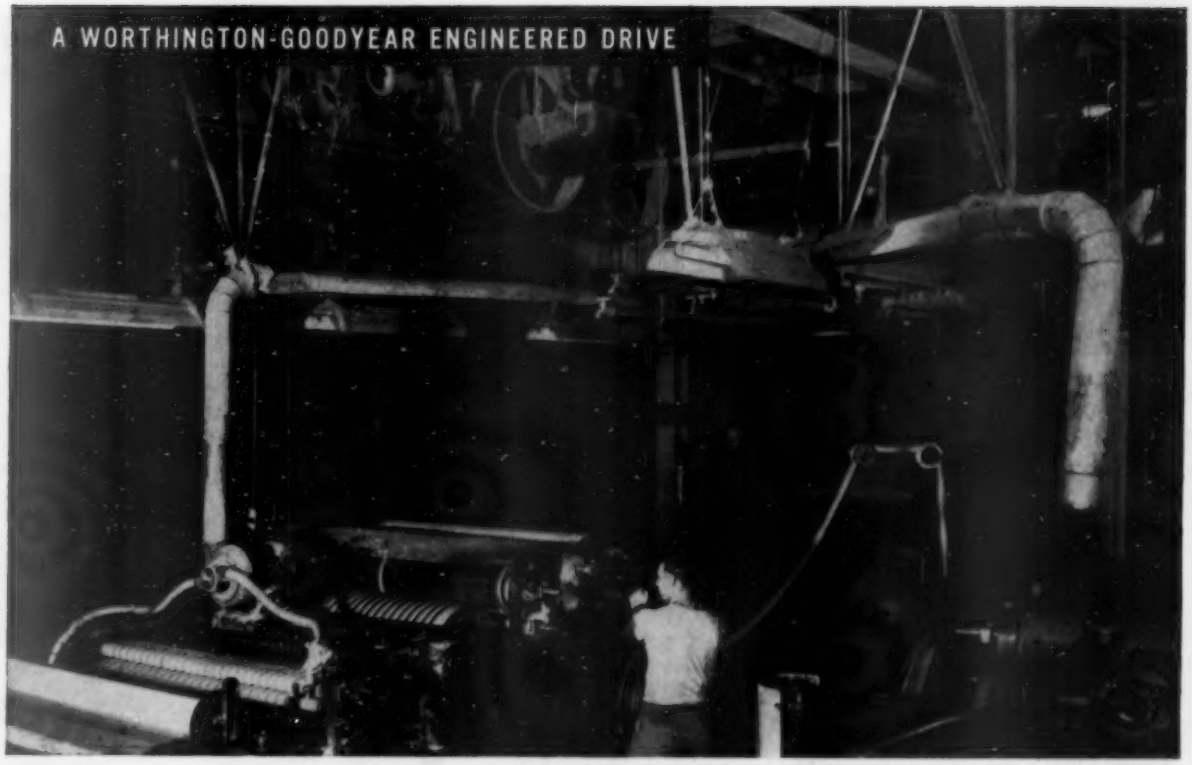

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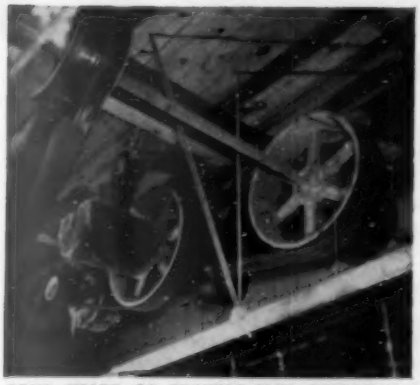

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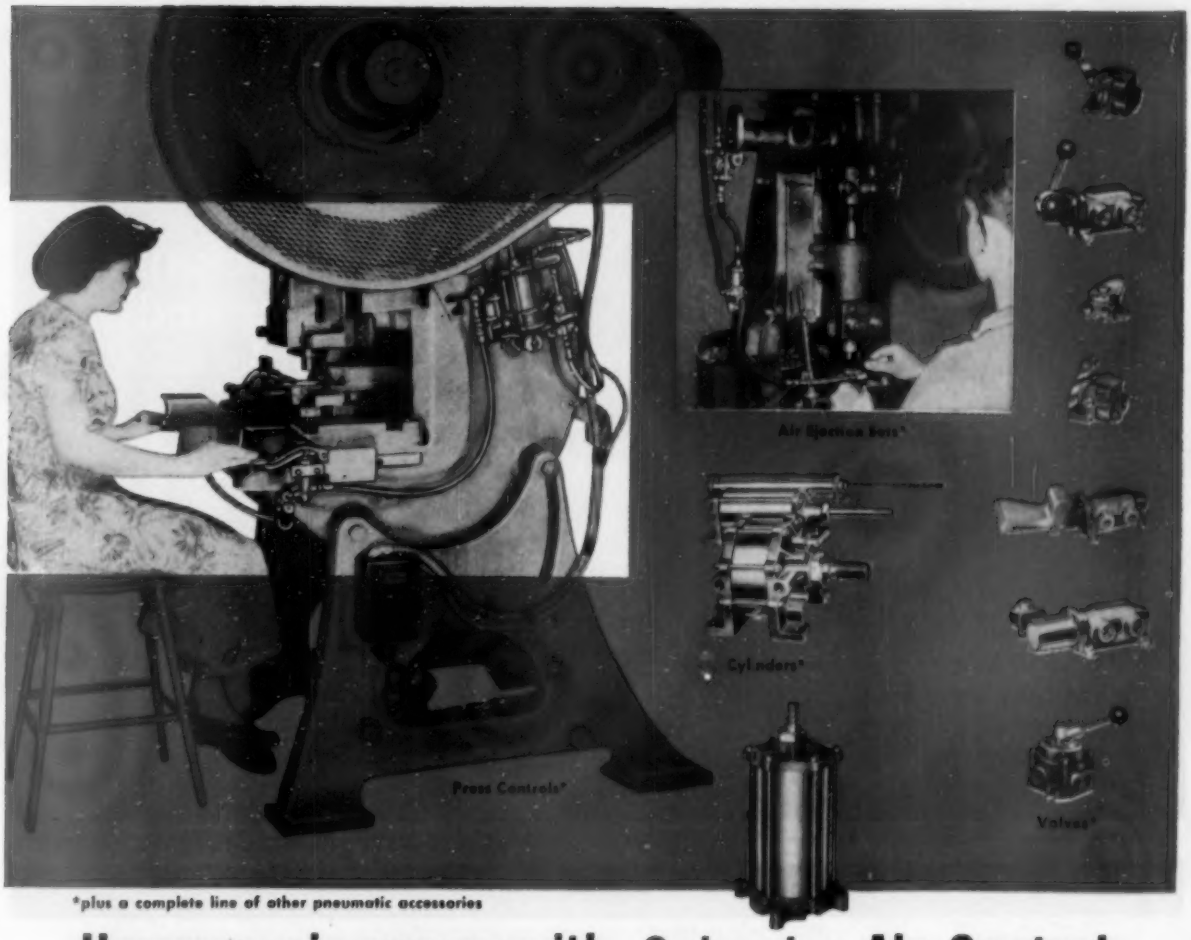

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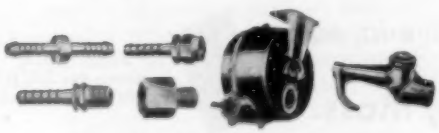

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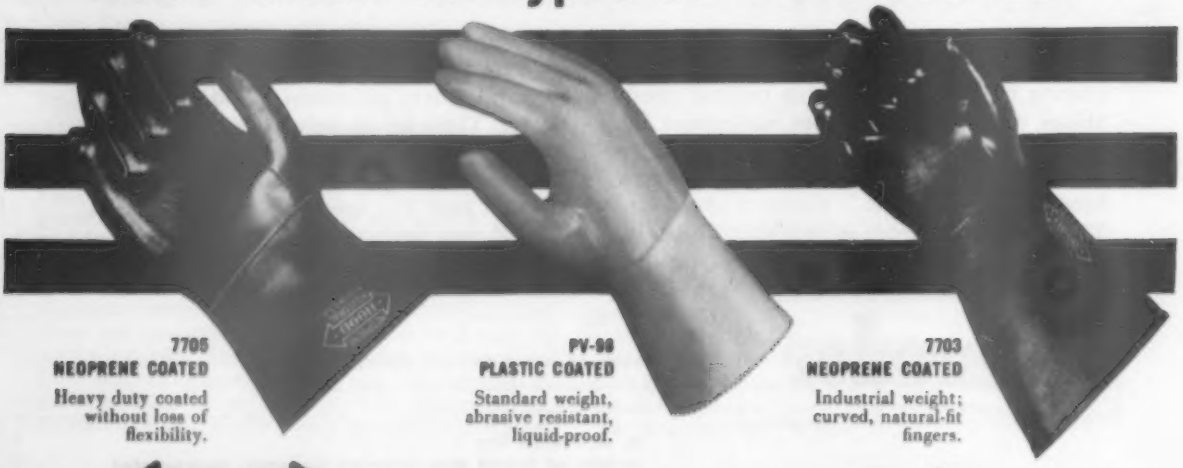

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FOAMGLAS®

the cellular, stay-dry insulation

"We licked our condensation problem because FOAMGLAS insulation stays dry in 64% humidity!"

states Donald Purrington, Supt. of Engineering, William Skinner & Sons, Holyoke, Mass.

Freedom from condensation is vital to quality control in the Holyoke, Massachusetts mill of William Skinner and Sons . . . home of world-famous Skinner silks and satins. The constant efficiency of *stay-dry* FOAMGLAS roof and wall insulation helped lick their condensation problem.

Mr. Donald Purrington, superintendent of engineering at the Holyoke mill relates: "The everchanging New England weather and high inside humidities made condensation a serious problem. That problem doesn't exist in our new FOAMGLAS insulated mill, built in 1948.

"Seven years' service has proved to us that FOAMGLAS stays dry for constant insulating efficiency—despite the 64% humidity we must hold for best loom operation. We get precise temperature-humidity control needed to prevent condensation, and have had no insulation replacement."

Mr. Purrington concludes: "In a high moisture situation like ours, it would be a definite mistake to use an insulation with less than the fully moisture-proof quality of FOAMGLAS!"

Take a tip from Skinner! Solve *your* insulating problems with FOAMGLAS, the cellular glass insulation that *stays dry* to give you long-lasting insulating efficiency. It's strong, fireproof and rot-proof, too. Send today for a sample and our latest literature describing the use of FOAMGLAS to insulate: (1) roofs, ceilings, walls and floors; (2) cold storage spaces; or (3) piping, tanks and other equipment. Indicate your specific interest.

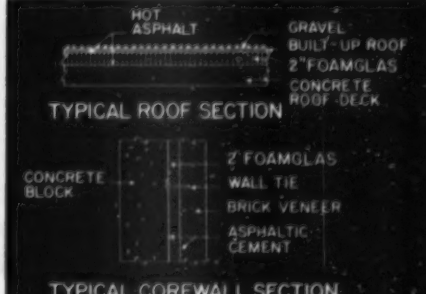
Pittsburgh Corning Corporation

Dept. M-105, One Gateway Center
Pittsburgh 22, Pennsylvania

In Canada: 57 Bloor St. W., Toronto, Ontario

Mr. Purrington is shown on the FOAMGLAS insulated roof of Skinner's Holyoke Mill. He reports: "The unusually high strength of FOAMGLAS eliminated all possibility of damage from roof traffic. Its effectiveness has exceeded our expectations."

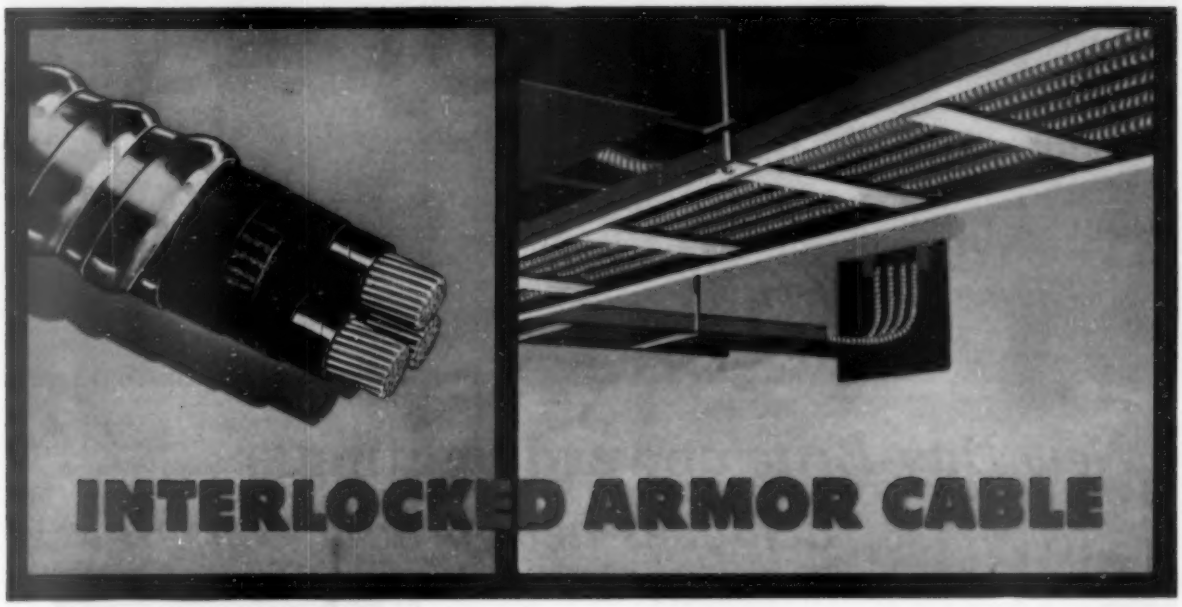
Engineers: Lockwood Greene Engineers, Inc., Boston, Mass.



FORD ASSEMBLY PLANT
San Jose, California
45 acres of fixtures at new Ford plant maintained at lower cost with
UP-RIGHT
aluminum scaffold-on-wheels
17 FT. SCAFFOLD ASSEMBLED IN 2 MINUTES BY 2 MEN
UP-RIGHT SCAFFOLDS
You, too, can save with these rapidly assembled Up-Right aluminum scaffolds.
Write for circular • Up-Right Scaffolds • Dept. 161 • 1013 Pardee St., Berkeley, Calif.

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE



INTERLOCKED ARMOR CABLE

Where extraordinary mechanical protection is required, any type of cable can be armored. General Cable offers this complete range of interlocked armor types:

Armor: copper, aluminum, bronze and steel. **Insulation:** varnished cambric, rubber and thermoplastic.

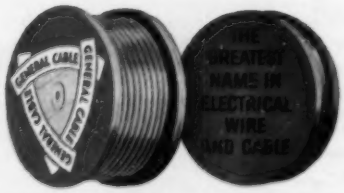
THE RESULT: a lightweight, flexible Interlocked Armor Cable that is ideal for wiring in close areas...under, down and around beams and pillars...where power needs vary...where plant layout presents space difficulties. Right angle bends, long runs and close quarter installations are easier to make and cost less than conventional cable and conduit.

To cut installation time and cost in new construction or old...Interlocked Armor Cable is used for primary or secondary feeders, and for connecting low-voltage plug-in bus and power utilization equipment.

From conductor to armor...General Cable offers you the ultimate in proven-in-use power and control cables...QUALITY that pays off in DEPENDABILITY, SAFETY, and EXTRA LONG LIFE.

Next time you are faced with a wiring problem that entails the need for mechanical protection ...look to General Cable for the simplest, most economical answer. And, remember, General Cable is the *only* manufacturer who can supply *all* your electrical wire and cable needs!

GENERAL CABLE
CORPORATION



BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

GENERAL CABLE CORPORATION
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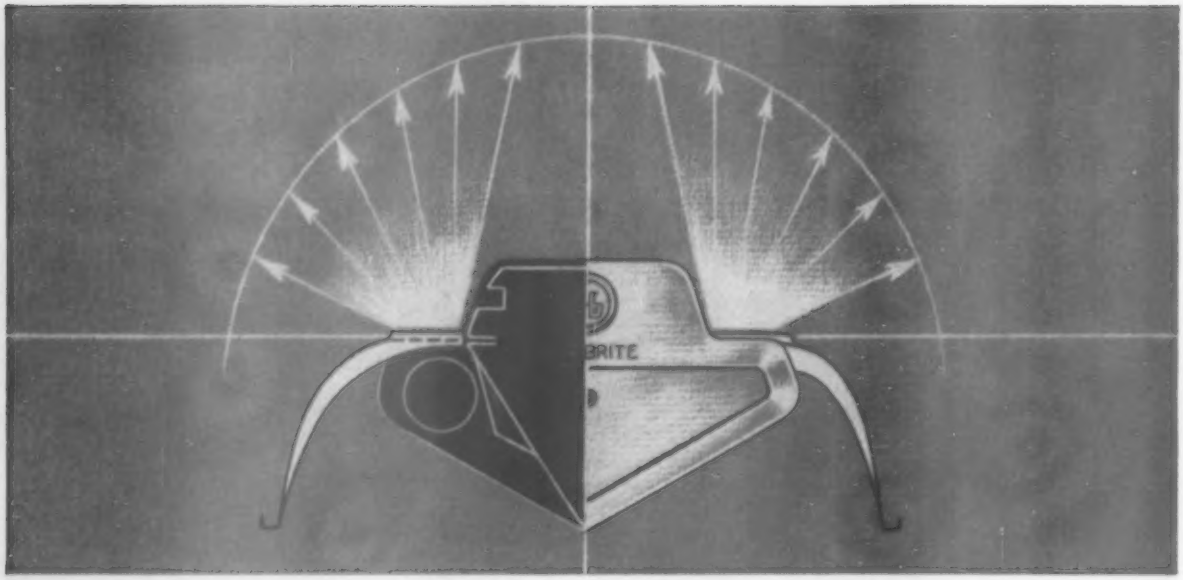


New Day-Brite upward lighting *achieves new production highs*

Visual tasks are becoming more and more acute as industry adopts new production techniques. Unusual accuracies, extreme tolerances, delicate color separations and speedy readings of charts and graphs demand the most in "see-ability" and the least in eyestrain. Both are supplied by Day-Brite new CFI (*C*omfort *F*or *I*ndustry) lighting—especially developed to establish a high degree of visual comfort for industry workers.

Radically different lighting system

The Day-Brite CFI principle differs radically from previous design and application practices. Slotted apertures are introduced *in the tops* of the fixture reflectors—a calculated portion of the available light is directed *upward* toward the ceiling. Harsh ceiling contrasts are washed out—"hot spots" of light eliminated. Advantage is taken of the reflectance values of lighter-colored walls and ceilings. Thus, visual strain and discomfort are largely avoided—eye shock is minimized—nervous and muscular tensions are lessened. Greater accuracies are possible—spoilage is reduced—accident rates are lowered—higher standards of production are realized.

Longer life...lower maintenance

Several additional values are built into Day-Brite CFI units: (1) Cooler operation and consequent longer lamp and ballast life result from natural updraft ventilation; (2) This updraft ventilation helps keep reflectors clean—less maintenance and more light value result.

Two types of Day-Brite CFI fixtures

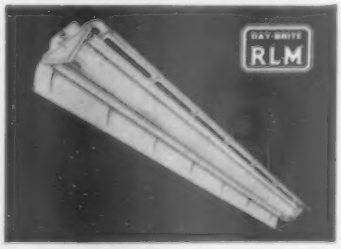
There are two types of Day-Brite CFI fixtures—the CFI-10, which provides for 10% *upward* lighting; the CFI-25, designed for 25% *upward* light distribution. Each of these fixtures is applicable to such installation surroundings as ceiling heights, wall and ceiling reflectances and the requirements of the visual task.

Take a look at the "comfort quotient" of the lighting in your plant. SEE, EXAMINE and COMPARE Day-Brite with any other lighting unit. Look at the fixtures, not just the pictures.

CALL YOUR DAY-BRITE LIGHTING REPRESENTATIVE. OR, SEND FOR CFI BULLETINS.

Day-Brite Lighting, Inc.,
5441 Bulwer Ave., St. Louis 7, Missouri

Day-Brite **CFI-10,** with 10% upward lighting component.



Day-Brite **CFI-25,** with 25% upward lighting component.

5480

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Inertol® paints protect new

$2,000,000

sewage plant

• Durable protection against chemical fumes and spillage, mildew, abrasion and saponification was needed for the new sewage plant in Rochester, Minnesota—world-famous medical center. That's why consulting engineers Tolz, King & Day, St. Paul, Minnesota, specified sturdy Inertol coatings for every surface to be painted.

Such colorful coatings as *Ramuc® Utility Enamel*, chlorinated natural rubber-base; and *Glamortex® Enamel*, finest quality alkyd, are on the job at this 100 per cent Inertol plant. These coatings may answer your maintenance problem as they have in both industrial and municipal plants throughout the country. Or perhaps you need *Rustarmor®*, Inertol's rust-neutralizing paint which:

• prevents and inhibits rust • covers 400-500 sq. ft./gal./coat • never gets sticky because it's hygroscopically controlled • resists fading, regardless of weather • comes in 11 glossy colors

Buy Inertol paints direct from the manufacturer. Shipments within three days from our plant, or from nearby warehouse stocks. For informative *Rustarmor* folder and color card MF-4, just write your name, title, firm name and address in margin of this page and mail.

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Engineered to outlast— Powered to outperform all others!

Model 606

Forget old ideas about power sweepers! This new Wayne embodies features not found on any other sweeper. Dust-free cleaning, outside or inside, with no dust bag to empty because of Wayne's exclusive "Filter-Vac." Hydraulic controls including power dumping. Automotive-type steering for better maneuverability and close-up sweeping. Safety shielding of moving parts. Years-ahead design and operating features.

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WAYNE

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World's Largest Producer of Power Sweepers for Cities and Industry

FASCINATING! HOSE COMES TO LIFE WITH PUNCH-LOK HOSE CLAMPS!

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PUNCH-LOK Company

"The sign of a GOOD Hose Clamp"

Dept. D, 321 North Justine Street, Chicago 7, Illinois

"It Really Made Me THINK!"

"The other day when the Detrex man was in to see me, he dropped a couple pieces of information that really made me stop and think. The first thing he pointed out was that metalworking and surface preparation account for ¼ to ⅓ of all the operations in the average metalworking plant. That started the gears rolling. If this was true in our plant, here was a good spot to realize some important dollar savings.

"Well, after finding that 30% of our operations were in metal cleaning and surface preparation, I knew this was the spot to cut some costs . . . and no better way to start than by talking to a technician from Detrex. After all, they make a complete line of chemicals for metal cleaning and surface preparation —as well as the equipment too.

"To make a long story short, the Detrex technician surveyed our plant and came up with several cost-cutting suggestions that were pretty important to us. You know, I bet he could do the same thing for you in your plant. You don't even have to take the time to make the survey. I found out he will do it for you and it won't cost you a cent. Most likely you, too, will realize some important savings as a result of the survey. Talk to the Detrex technician about it the next time he calls, or write direct to their main office if you wish."

Service with a Saving!

DETREX CORP.

Dept. 617 • Box 501 • Detroit 32, Mich.

DEGREASERS • DEGREASING SOLVENTS • WASHERS
ALKALI & EMULSION CLEANERS • DRYCLEANING
EQUIPMENT • PHOSPHATE COATING PROCESSES

Phosphate Coating

Detrex zinc phosphate coatings provide a permanent, rust-resisting surface and at the same time bonds the paint finish to the metal. Paint peeling and flaking are retarded, corrosion from moisture is prevented. Phosphate coatings can be economically applied by either immersion or spray methods.

Emulsion Cleaners

Detrex emulsions clean metal and retard rust in one operation. Once metal parts have been cleaned with Detrex Emulsion Cleaners rust will not attack them. Because they will not attack any known metal or alloy, Detrex Emulsion Cleaners offer greater flexibility. Temperatures, concentrates and chemicals can be tailored to your specific cleaning needs.

Degreasing Solvent

Detrex Perm-A-Clor has superior stability and resists break-down into sludge or corrosive acid. Thus, Perm-A-Clor assures trouble-free, continuous production. Eliminates costly shutdowns for replacement of spoiled solvent, clean-out of sludge and neutralizing of cleaning equipment.

Don't Be "Sold"... Get The Facts

MAKE UP YOUR OWN MIND

about the metal lathe best for you

Here are the FACTS about the Great NEW Rockwell-built DELTA 11" Metal Cutting Lathe

ACCEPTED THROUGHOUT INDUSTRY...

This great new Delta Lathe has—in less than one year—gained tremendous acceptance throughout industry. Users agree that it's the finest 11" metal lathe on the market!

REPLACING HIGH PRICE LATHES...

This versatile Delta Lathe is replacing lathes costing far more. That's because years of intensive development and testing assure precision *plus* extra ruggedness.

MORE QUALITY FEATURES AT LESS COST

No other 11" metal lathe, *regardless of price*, offers you so many precision, safety, and convenience features. Delta's unsurpassed power tool experience gives you highest quality at lowest price!

GET ALL THE FACTS, THEN COMPARE...

See this great new Delta lathe demonstrated—actually try it yourself. Then compare with any lathe of comparable size and MAKE UP YOUR OWN MIND. Your Delta Dealer is listed under "TOOLS" in the classified pages of your phone book. Delta Power Tool Division, Rockwell Manufacturing Co., 628K North Lexington Ave., Pittsburgh 8, Pa.

HERE'S HOW USERS HAVE "MADE UP THEIR MINDS"

R. H. Plourde, N.E. Die Co., Waterbury, Conn.: "Excellent for its power and precision. We intend to standardize on Delta."

E. J. Coats, owner of Pine Grove Mfg. Co., Ripley, Miss.: "We waited a year for the new Delta Lathe. Certainly wouldn't want to be without it."

R. J. Hood, President of Eastern Tool Co., Hartford, Conn.: "Extremely rugged even compared to costlier lathes. Simple changing of speeds and drives saves us money every day."

D. Hart, Sales Manager of Carros & Hart, Bristol, Conn.: "It's the best lathe of its type. It makes heavier cuts faster than some of the other more costly lathes available."

J. A. Stupian, President of Ordnance Specialties, Inc., El Monte, Cal.: "We chose Delta because of the need for a rugged, yet precision, lathe. Not only is the new Delta lathe capable of outstanding performance, but it is also very economical."

A. Janson, President of Janson Tool & Die Co., Toledo, Ohio: "It's rugged and accurate. We can recommend it to anyone."

Get all the facts. Send for this great new "fact" book . . . today!

DELTA QUALITY POWER TOOLS

Another Product by ROCKWELL

Circle No. 39 in the Catalog News Section on the Reader Service Card on page facing back cover.

DELTA QUALITY COSTS NO MORE

It's going to be **COLD** OUTSIDE and **INSIDE**, too,

for personnel in plants where doors are operated *MANUALLY*

MAGIC EYE installation, operating combination of a swinging and a sliding door at White Motor Co. plant, Cleveland, Ohio, reduces heat waste to a minimum, speeds flow of materials.

STANLEY *Magic Door* **CONTROLS**

REDUCE ABSENTEEISM DUE TO ILLNESS, IMPROVE EMPLOYEE MORALE AND SAVE TIME AND MONEY

When manually operated doors open to the cold outside weather — in shipping rooms with adjacent loading platforms, for example — plenty of cold air rushes in. Worse than that, workers using these doors practice the bad habit of propping them open. Inside, personnel suffer — and their work suffers, too, as they take time out to complain about the uncomfortable gusts of cold air they are subjected to. There's another costly effect — absenteeism due to illness caused by the drafts of cold air. ***In any case, the loss in man hours is heavy!***

Minimize this loss by installing Stanley Magic Door Controls. Then, your plant doors will open automatically on approach, close automatically after the worker has passed through. Doors will stay open ***only as long as is absolutely necessary***.

Any door or combination of doors that swing, slide or fold can be operated by one of the Stanley Magic Door Controls — MAGIC EYE (photoelectric), PULL CORD, or PUSH PLATES. Mail coupon below for complete information.

STANLEY ® *Magic Door* CONTROLS

REPRESENTATIVES IN PRINCIPAL CITIES

MAGIC DOOR DIVISION, The Stanley Works
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☐ *Please send full information on Stanley Magic Door Controls.*
☐ *Please have Representative call.*

Company Name _____

My Name _____ Position _____

Company Address _____

City _____ Zone _____ State _____

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National Electric JUMBODUCT now offers industry three times the capacity previously available plus freedom from the hazards of overhead wiring. It permits flexible, attractive, plant layouts by providing readily accessible electrical underfloor distribution at a minimum investment.

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2″ pipe threaded outlets every 24″ permits exact location of equipment

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- Easy-to-handle 10′ lengths
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- Protected against corrosion by Sherardizing.
- Coated with a baked-on acid-resisting enamel.
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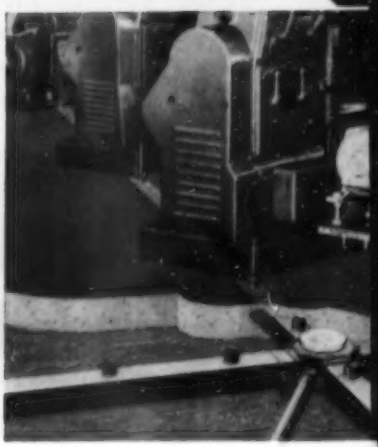
Get the details on JUMBODUCT today! Write for your free copy of the engineering Data Book on NE JUMBODUCT



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...and equally suitable for use with HAND TOOLS

All Apex nut running tools are specifically designed and built for use with power impact tools. Precision machined from high carbon electric furnace alloy steels, these tools are cold broached and heat treated to withstand the severe shocks and strains of impact tool use.

The longer service life of Apex nut running tools has been proved on power tool applications in almost every industry. It follows, then, that even longer service life can be expected when Apex tools are used on standard hand tools, where service is not as rugged.

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CATALOG 29-R lists more than 5,000 stock types and sizes of Apex nut running tools. Write, on your company letterhead please, for your copy.

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A competent engineering staff will counsel with you on the most efficient technique for handling your particular requirements.

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Increase production hundreds to one over hand methods. Reduce labor costs. Eliminate need of experienced workmen.

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Controlled Heat Soldering Irons

are better ... faster for Printed Circuits!

Light weight, perfectly balanced, small size, controlled-heat Kwikheat Type 200 soldering irons are designed for close soldering. Sealed, high temperature, built-in thermostat maintains pre-set heat (800° for production, 700° for stand-by). Kwikheat irons, weighing only 7½ oz., are economical — maintaining heat on only one-third of heater capacity. Three versatile plunger-type tips are easily changed in the field.

For better, faster work — at lower cost — switch to KWIKHEAT soldering irons.

KWIKHEAT Manufacturing Co.
3732 San Fernando Rd., Glendale 4, Calif.

...with FIBERGLAS REINFORCED PLASTIC WINDOW PANES

shatterproof! easy to install! diffused light! color built in!

Say goodbye to expensive problems of glass window breakage when you glaze your factory windows with *flat* Fiberglas*-reinforced plastic panes. This new translucent shatterproof glazing material slashes daylighting maintenance costs by eliminating broken windows . . . admits a soft, even illumination to work areas—with no need to paint windows to reduce glare.

These colorful Fiberglas-reinforced panes come in standard sash sizes, in pebbled or smooth finish. According to the glazing manufacturers, these panes need not be handled with care . . . they are shatterproof, easy to install, weather-resistant, and shrug off attack by fumes of most acids, alkalies and organic solvents found in industrial plants. They will not crack, craze, shatter or distort. They are dimensionally stable.

These panes have almost twice the thermal insulating properties of regular window glass. Scientifically-selected blue, water white or rose colors, used where high light transmission is required, give a cheerful psychological lift to workers. Special green panes solve the problem of *too much* sunlight with a heat blocking material that cuts light intensity 70%.

For all new industrial construction, or broken glass replacement, specify this new glazing material—Fiberglas-reinforced plastic panes.

Owens-Corning Fiberglas Corp., Textile Products Div., Dept. 85-J, 598 Madison Ave., N. Y. 22, N. Y.

OWENS-CORNING
FIBERGLAS

Owens-Corning Fiberglas Corp. does not manufacture these plastic window panes. It supplies the Fiberglas reinforcement to the glazing manufacturer.

*T. M. Reg. O-CF. Corp.

WITH EVERY ADVANCE FEATURE FOR EFFICIENT ASSEMBLY OPERATIONS

This wide span, three motor, cab-controlled crane is ideal for assembly floor operations.

It has hoists of two capacities, is capable of rapid lateral and longitudinal travel or the precise vertical movement so essential in assembling vital parts of valuable machines.

Basically of course, it is a Euclid Crane which assures dependable and efficient performance with low cost of operation and maintenance.

Available also are: Euclid Cranes, evolved through years of experience and specifically adapted to the peculiar needs of practically every industry. *Write for new catalog available.*

The EUCLID CRANE & HOIST Co.
1364 CHARDON ROAD
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CUT WIRE PULLING TIME 60%

BARTH
ELECTRIC POWERED
CABLE PULLER

Pushes tape — Pulls wire — ELECTRICALLY!

Instead of 2 to 8 men—one man can now push tape through 175 feet of conduit, around five 90 degree bends; then pull wire back—all in a fraction of the time formerly used. Ideal for difficult runs impossible to push by hand.

The Barth Cable Puller attaches directly to conduit—no strain on junction boxes. Light weight only 70 pounds. Operates on 120 volts. Rugged, quick to set up, easy to move from job to job.

Complete details and prices—MAIL THIS COUPON TODAY!

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12658 Brookpark Road, Cleveland 30, Ohio

Please send complete Cable Puller data folder and prices.

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YOUR COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

Distributed Nationally by
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Featuring Darnelloprene treads—a soft, resilient Neoprene rubber compound that has superior qualities in resistance to oils, waxes, most chemicals and oxidation—these casters offer ease of movement, quietness and adequate floor protection.

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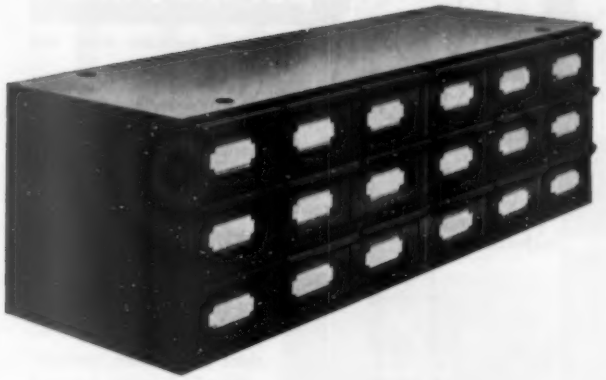
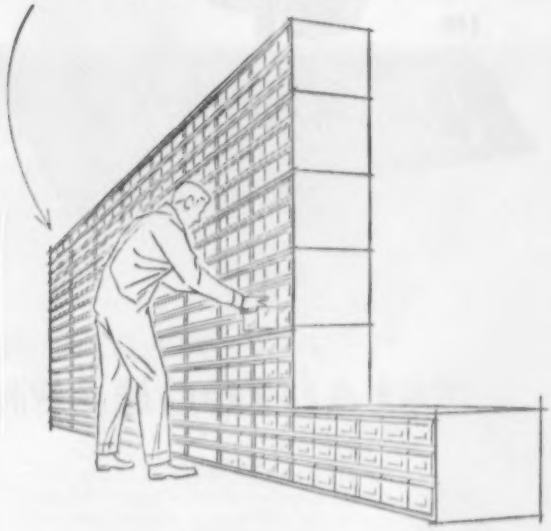
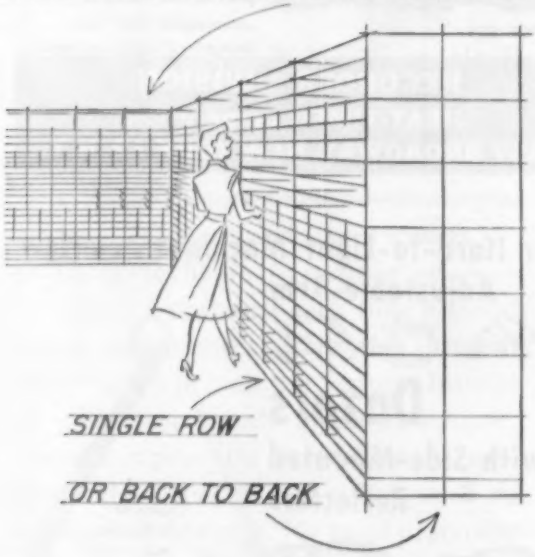
HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE



STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT



USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2093 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 11, Pa.

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Delivers messages, sketches, business data... on plain paper or Instan-Forms* designed for your business data...to one or more stations you select—within the company or many miles apart.

Cost Averages under $1 a day per station!

Electronic Longhand, the result of 65 years' experience in communications, saves thousands of dollars yearly for companies such as Ford, B. F. Goodrich, Raytheon, Hotel Statler, Northrop Aircraft and St. Luke's Hospital (New York). 2500 major concerns now use it profitably in practically every type of business:

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"...and, we will install your units on all our machines."
"...meets all our requirements. Ship 35 more units at once."

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TIME RECORDER-TOTALIZER

PRICE $55.

• This precision instrument provides accurate, permanent, chronological data about any machine, process or system in plant or office ...on a continuous chart-roll which lasts four months. Uses no ink. Totalizer shows accumulated "on" time.

descriptive literature on request

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HEAT-TIMER corporation
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For Hard-to-Light Machines . . . New Adjustable-Arm

Air-Cooled

Dazors with Side-Mounted Reflectors

Choice of Arm Extensions: 31" (No. 1102) 20" (No. 1103) Same Price

Now it's as easy to beam light into a recess, or around an offset, as onto a simple tool or bench position. This Adjustable-Arm Dazor with side-mounted reflector offers same low-cost air-cooled efficiency and positive tension control as top-mounted style. Uses 60-w bulb. Call your Dazor distributor. Dazor Manufacturing Corp. St. Louis 10, Missouri.

...Makers of

DAZOR FLOATING LAMPS

Now Biggest advance in waste receptacles since the scrap basket!

The new Nibroc®

TAMP*

Holds up to 40 times more waste than conventional receptacles!

A revolutionary new combination Nibroc Towel dispenser and waste receptacle—the Nibroc Tamp—now offers industrial and business establishments new economy, convenience and safety in disposal of paper and paper towels.

The secret lies in the built-in automatic tamper—operated each time a pedal opens and tightly closes the disposal door—a fire prevention feature. Instead of gathering loosely in the receptacle, waste is repeatedly tamped into a compact bale. Capacity is thus increased by as much as 40 times. No need to handle the waste . . . it is compressed into a break-proof paper bag—making disposal easier . . . cuts maintenance costs.

Sold by the manufacturers of famous Nibroc Towels, the Nibroc Tamp with built-in Nibroc towel dispenser is available in 2 models, finished in baked-on Bermuda green pastel enamel. Tamps are also available without dispenser.

See your classified directory for name of your nearest Nibroc Towel distributor, under "Paper Towels" or write Dept. N-10, our Boston office.

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*Patent pending in U. S. and Canada

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with NELSON HIGH VOLTAGE, FUSED MOTOR STARTERS

- √ Safety interlock prevents access to fuse compartment until motor is taken off line.
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Weatherproof assembly for controlling two 125 h.p. synchronous motors on compressor drives in chemical plant.

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STEEL CORPORATION • KOKOMO, INDIANA

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eliminates dust at its source!

TORIT UNITIZED **DUST CONTROL** means each machine has its own custom-tailored dust collector designed to work specifically for *that* machine. There is no guess work, or average suction. Furthermore, dust control is provided only when that machine is running . . . there is no waste of power such as you have with centralized control when only a few machines are operating. This means better dust control at lesser operating cost and less initial installation cost. Get the facts now on how Torit will work better to . . . "CLEAR THE AIR".

See our catalog in Sweet's Machine Tool File, or write:

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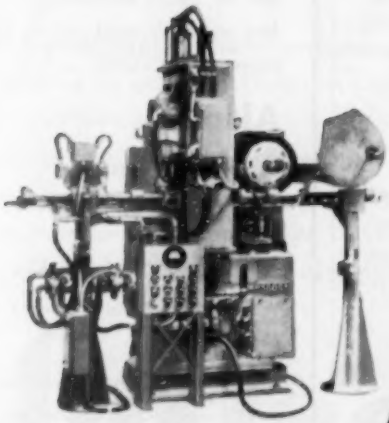
BRUSHAMATION BY OSBORN



AUTOMATED BRUSHAMATIC®...One of Osborn's integrated production line automatic power brushing machines.

The parts shown above are typical of the work you can now handle with Osborn's line-production power brushing method... ***BRUSHAMATION.***

COMPLETELY INTEGRATED...Osborn's Automated Brushamatic® Equipment fits right into your production line.

ELIMINATES BOTTLENECKS. It is now possible to remove burrs, blend surface junctures, remove weld scale, clean parts on a continuous line-production basis.

AUTOMATES FINISHING OPERATIONS... takes parts right from your production lines, feeds them to rotating power brushes, delivers them precision-finished to micro-tolerances where necessary

... all without manual handling.

Qualified engineers will show how you can benefit with automated brushing at the Osborn Booth 718, The Metal Show, Philadelphia, Oct. 17-21. If you can't make the show, write us for complete information. *The Osborn Manufacturing Company, Dept. H-34, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

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OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

New Holcomb T-GUARD

seals terrazzo floors dirt-tight— cuts maintenance cost to rock bottom!

New Holcomb T-GUARD actually *penetrates* terrazzo and provides a tough, invisible surface seal that defies dirt and traffic. It seals so tight that daily dirt is easily *swept* away. Practically eliminates time-consuming, high-cost scrubbings; drastically reduces number of wet-moppings needed.

T-GUARD also:

- **Is anti-slip . . . not a wax or varnish.**
- **Never needs buffing . . . has rich sheen.**
- **Enhances floor beauty . . . it's transparent.**
- **Lasts months . . . prevents stains, wear.**

Let your Holcombman demonstrate how T-GUARD can save labor and material costs on *your* terrazzo floors.

Scientific Cleaning Materials

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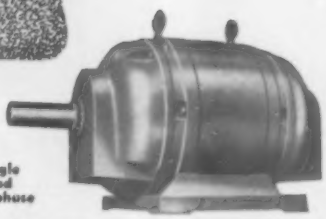
NEW YORK DALLAS LOS ANGELES

CUSTOM-BUILT— NOT CUSTOM PRICED



Single and Polyphase

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

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Also . . . .

be sure to give us *both*

(1) **your OLD address**
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We need them *both* to make the change.

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with

Lustra JADE-LITES

Here, in capsule form, is the case for using LUSTRA Jade-Lite Fluorescent Tubes, as reported to us by hundreds of firms that use them:

"Increased employee efficiency because greater light output and less glare help eliminate eye strain in close, critical work areas, resulting in higher production"

We might add that the guaranteed extra-long-burning of Jade-Lites brings further economies in replacement and maintenance costs.

SEE FOR YOURSELF! Your local Lustra Man will be glad to demonstrate the efficiency of Jade-Lites under your own working conditions. In addition, he can dispose of almost any lighting problem with the complete line of LUSTRA Double Duty Lamps, Fluorescent Tubes and allied electrical products. Write for literature to **LUSTRA CORPORATION, DEPT. FML-10, 36 Washington St., Brooklyn, N. Y.**

Lustra

AMERICA'S DATED LAMPS

To PREVENT VIBRATION trouble later...

...See KORFUND NOW!

→ Korfund Steel Spring Vibro-Isolators installed without bolting to the floor under these presses at Wells Specialty Company, Inc., North Liberty, Indiana, permit rapid rearrangement of production lines. Effective Korfund Vibration Control also permits press operation at considerably higher than rated speeds without vibration—something the simple felt pads previously used by Wells Specialty Company could not do. (Since the 200 ton press at left requires a pit for its pneumatic cylinder, the Vibro Isolators are installed below floor level.)

← A Four-Time Loser! After four different schemes for controlling vibration of their 180 ton capacity press were tried at a cost of well over $1,000.00, without success, Sterling Industries Inc., Philadelphia, called in their local Korfund representative. Four standard Korfund Steel Spring Vibro-Isolators installed directly under the press solved the problem. Total cost—$332.00.

ALL KORFUND STEEL SPRING VIBRO-ISOLATORS HAVE ADJUSTABLE LEVELING BOLTS... A KORFUND FEATURE FOR OVER 30 YEARS!

When dishes rattle and plaster cracks in homes near your plant, as happened in the two cases described above, you know your vibration control equipment is not effective. Usually your neighbor's attorneys will suggest you do something about it. Many problems such as this, as well as those involving interference with precision machinery in the plant, damage to the building structure or the press itself, etc., are brought to Korfund for solution.

We usually find the trouble lies in depending on one type of Isolator to do the job. We believe one product or even one type of product cannot solve all vibration problems efficiently and economically. We make several different types—each one designed for a particular set of conditions.

That's why when you bring your vibration problem to Korfund, you get our impartial recommendation on isolation media whether it be springs, rubber, or cork—alone, or in combination. We have all three—we favor none. Our only interest is your satisfaction.

For your free equipment isolation Selector Chart and additional data on increasing production and reducing costs, write for copy of Bulletin 21, or see our catalogue in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half century of experience is at your disposal.

THE KORFUND CO., INC.

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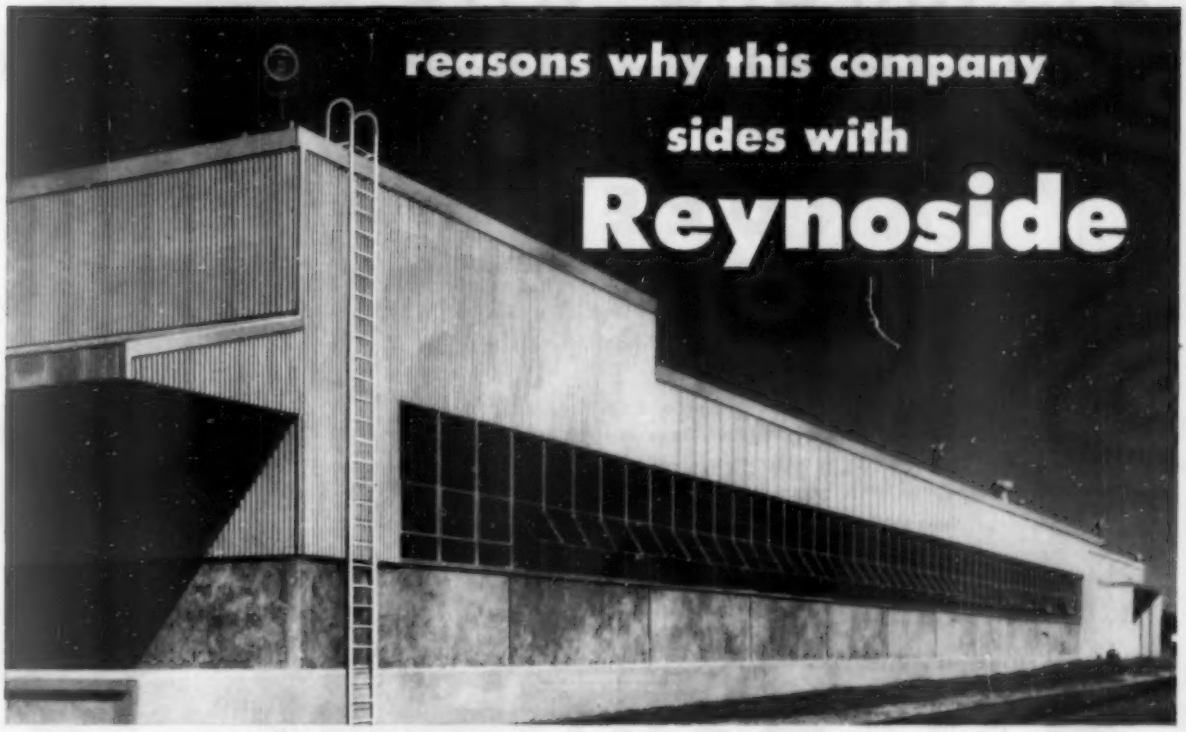
making a
MARKED IMPROVEMENT
In DECORATIVE PRODUCT MARKING

Decorative printing on odd-shaped products—like the three-color work on these plastic dolls—is just one way the Markem Method cuts costs and gives manufacturers better-looking, better-selling products. Parts and packages, too . . . flat, round, irregular, big and little . . . made of paper, plastic, wood, glass, leather, rubber, fabric—are being marked better and faster with Markem machines, types and inks specially designed for the jobs. Since 1911, Markem has been helping industry make its mark. We'd like to help you make yours. Markem Machine Co., Keene 18, New Hampshire.

MARKEM ...to MAKE YOUR MARK

"Low-Cost and Maintenance-Free"...



Low applied cost and low maintenance (no painting) are the principal advantages cited by Century Mfg. Co. of Jackson, Miss., for *Reynoside*... Reynolds *Lifetime* Aluminum ribbed-embossed siding. You can see another advantage in the photo... modern appearance. And the workers know still another... better year-round temperatures, because aluminum reflects radiant heat. Give this rustproof, corrosion-resistant material full consideration for your next building. Write for literature on Reynoside.

Architect:
John Turner, Jackson, Miss.

Jobber-Erector:
Nathan Daniels Roofing & Supply Co., Meridian, Miss.

A complete installation service is available. For name of nearest franchised jobber-erector, call the Reynolds office listed under "Building Materials" in classified phone books of principal cities. Or write to Reynolds Metals Company, Building Products Division, 2007 South Ninth Street, Louisville 1, Kentucky.

REYNOSIDE SPECIFICATIONS:
THREE TYPES:
(A) 4" rib, .032" thick. (B) 8" rib, .032" thick. (C) 8" rib, .040" thick. Rib depth, 1".
Finish: Stipple-embossed.
Lengths: From 5' to 14' 5½". Special lengths to order.
Width: 41⅝" over-all; nominal coverage 40".
Weight per square: (A) 59.4 lbs. (B) 53.1 lbs. (C) 66.4 lbs.

REYNOLDS ALUMINUM
BUILDING PRODUCTS

See "FRONTIER," Reynolds new dramatic series, Sundays, NBC-TV Network.

GROUND-IN GRIME

REMOVED SAFELY, GENTLY WITH HANDEEZ

Shop grime lurking deep in pores . . . tiny nicks in skin from HARSH cleaning compounds . . . these are factors which may lead to painful, efficiency-reducing dermatitis.

HANDEEZ lifts grime out GENTLY by means of a sterilized vegetable emollient—acts like millions of tiny, soft brushes—leaving the skin smooth and clean. Office as well as shop workers prefer HANDEEZ to other compounds for its gentle yet thorough cleansing action.

For "Extra-heavy-duty" hand cleaning, use

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BRULÉ TRASH BURNERS . . .

PORTABLE • FAST ACTING • HIGHLY EFFICIENT •

Simplify your trash burning problem and save money doing it

The Brulé FG4-T series gives industry packaged units—simple to set in place and to install, each with a comparatively short stack shipped in two sections for erection. Interior installations can be made—as required—from basement to roof. Outside installation can be made through a wall with charging done from the inside of the building. Brulé step and flat grates assure peak fire chamber temperatures. No stoking. Walls are air cooled. Auxiliary fuel burners, oil or gas, available on all models.

• More than 40 years of design experience is back of these units. Available in 200, 300, and 500 lbs. per hour capacity. Get the complete, important story.

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Fast with

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STRATOGRIP HOSE FITTINGS

Fittings and hose designed for quick make-up by hand without tools. Excellent for automotive and industrial lines carrying water, hot oil, gasoline, diesel fuels, anti-freeze, L-P Gas, vacuum gage and air applications. Double fabric braid. Impregnated fabric cover. Working pressures to 250 psi. At your dealer.

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(illus.)
also Push-Button or Cable Control

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PRODUCTION AIR HOIST *to fit your job!*

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300 lb.
100 lb.

VARIABLE SPEED . . . 1000 lbs., 0 to 38′ per minute . . . 2000 lbs., 0 to 20′ per minute . . . load can be inched or zipped.

AIR-POWERED FOR SAFETY . . . no spark hazard . . . explosion-proof motor . . . can't burn out . . . can't overheat . . . unaffected by dust or fumes.

LIGHTWEIGHT . . . only 28½ lbs. for 1000 lb. hoist . . . 2000 lb. hoist weighs only 47 lbs. Overall length all models, 10½″ to 11⅛″.

TRY THIS WITH ANY OTHER HOIST!

You can inch so slowly that you can touch an egg without breaking it!

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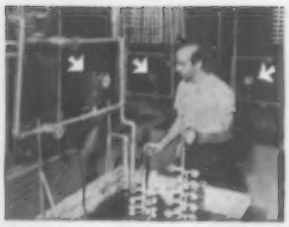
For Plating, Cleaning and Rinse Tanks



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No. 11-MF
Self-Operating
TEMPERATURE
REGULATOR

HAS EASY TO READ 4" DIAL THERMOMETER

PLASTIC COVERED THERMAL BULB AND TUBING
Highly resistant to metal finishing solutions

SIMPLE TEMPERATURE ADJUSTMENT

DURABLE CONSTRUCTION

VALVE STEM LUBRICATOR
Helps give better control, keeps valve stem working freely

EASY TO INSTALL
No insulators required

Simplest, Most Reliable Control Made
Holds Temperature at the Right Point
Savings Often Repay Its Cost 3 to 6 Times a Year

Why Powers No. 11-MF Regulator Gives Better Control and Lasts Longer—better TEMPERATURE Control results from powerful bellows and minimum of valve stem friction. Valve Stem Lubricator aids easy movement of valve stem without binding. Double ply metal used in Powers bellows outlasts ordinary single ply type. Greater durability of plastic covered bulb and tubing also helps prolong the life of the regulator.

Dial Thermometer indicates temperature of solution under control. It gives a visual check of the process and makes it easy to adjust regulator for different temperatures.

Eliminate "the human element" in temperature control with Powers automatic Regulators. They're simple, compact and dependable. They stop OVER-heating, prevent "boil-overs," waste of steam, water wasted by evaporation, burnt plated parts, rejects, decomposition of costly additives and loss of volatile ingredients from cleaning solutions.

Powers Nationwide Service and 24 Hour Delivery in the U.S.A. are important time and money saving advantages. Order a Powers No. 11-MF Regulator now. Call your supply firm or write us direct for Bulletin 330 and prices. (c43)

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

Over 60 years of Automatic Temperature and Humidity Control

WANT SOME REAL JOB HELP?

Here's a list of reprints which have already proved their value to Factory readers.

The subjects covered in these reprints are varied. Many of them you might wish to have for your own personal library. Others you may want to order in larger quantities for distribution to people in your organization. All the articles listed here in stock, in limited quantities. First come, first served. Write to: Editor, FACTORY

How to Use Your Time Better
How to Improve Your Memory
How to Rough Sketch Your Ideas on Paper
How to Read Faster and Better
Tips on Talking Better
Work Sampling**
Sonic Energy**
How You Can Use Radioisotopes**
How Good A Leader Are You At Getting Better Production
How to Pick People Better
Telling Employees Where They Stand
How Good a Leader Are You
How to Solve Your Parking Problems
Organizing for Disaster
How to Protect Your Plant
Disaster Without Warning
How Fixed Variable Cost Control Helps Produce Profits
Special Report on Incentives for Supervisors
Worker Psychology — A Formula That Works
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Cuts Rejects and Inspection Cost
G M's Fire **
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500 copies up — 15¢ each
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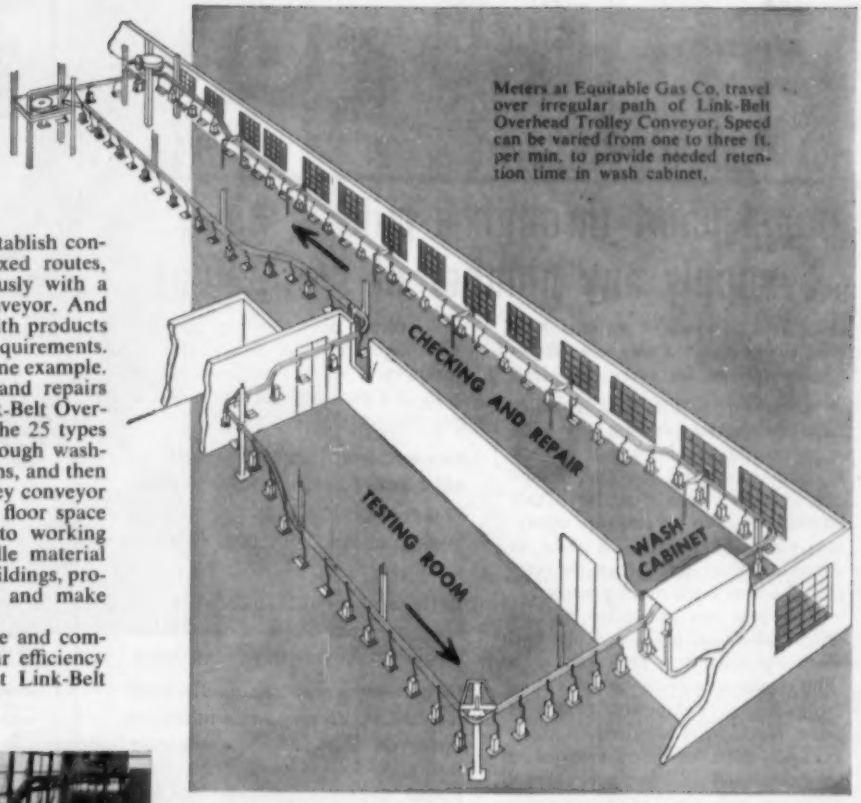
Shipping charges will be added to all orders for over 50 copies.

This LINK-BELT Overhead Trolley Conveyor

adjusts to varying products and process requirements

Inspection and repair of 25 sizes and types of meters coordinated at Equitable Gas Co., Pittsburgh, Pa.



Meters at Equitable Gas Co. travel over irregular path of Link-Belt Overhead Trolley Conveyor. Speed can be varied from one to three ft. per min. to provide needed retention time in wash cabinet.

WHEREVER it's possible to establish continuous handling along fixed routes, you can reduce costs tremendously with a Link-Belt Overhead Trolley Conveyor. And its flexibility permits use even with products of diverse size and processing requirements.

Equitable Gas Co. provides a fine example. This Pittsburgh utility inspects and repairs 30,000 gas meters annually. Link-Belt Overhead Trolley Conveyor handles the 25 types and sizes from testing room, through washing, checking and repair operations, and then back to testing area. With a trolley conveyor you put ceilings to work — save floor space with conveyor dropping down to working area only where required, handle material continuously between floors or buildings, provide better working conditions, and make more effective use of manpower.

Link-Belt conveying experience and complete equipment can bring similar efficiency to your plant. Call your nearest Link-Belt office or write for Book No. 2330.

Workman checks valve action before passing meter to repair station. Low elevation of conveyor allows unrestricted entrance of light through windows.

The New Link-Belt Ball Bearing Trolley. Ask for Book 2536.

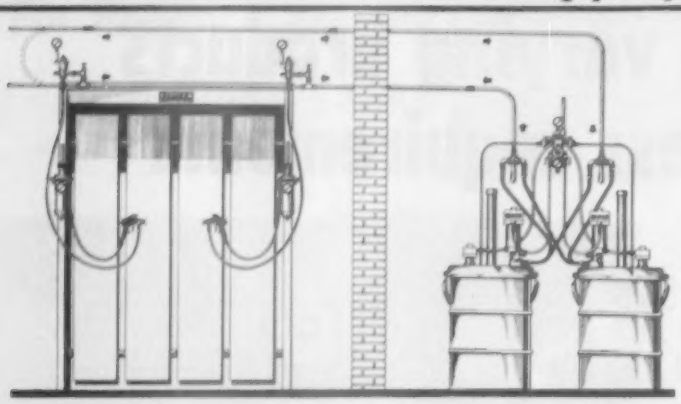
Meters en route to washing and degreasing cabinet. Wire mesh bottom carriers assures spray effectively reaching bottom and sides of meters.

LINK-BELT

IN-THE-FLOOR AND OVERHEAD TRUKVEYORS
OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

WHAT'S NEW in material handling pumps



pump paint through a mile of pipe...
...supply any number of spray guns

Binks new air-operated material handling pumps open the way to paint circulating systems for every size plant.

In a system of this kind, paint is circulated under pressure past each spray station and back to the drum. Binks new material handling pumps are ideal for this purpose. They can force paints of average spraying viscosity through a mile of suitable piping, *direct from the original drum* or from mixing tanks.

Now you can centralize all material handling, paint mixing, and viscosity control in one spot, with these major advantages: Color matching of component parts is easy. No time is required to transport paints to the spray stations or to clean and fill pressure tanks. Spillage and paint contamination are eliminated.

The above diagram shows a two-pump-per-color system. One pump supplies paint to the spray guns while the other is raised to allow replacement of the empty drum... or is agitating the paint prior to pumping. A valve switches the flow from one pump to the other. Not a moment's production is lost.

Here are some of the new features which make Binks pumps your best buy:

Power-plus: These new pumps will feed paint to any number of spray guns.

Delivers more: Pumps paint on both up and down stroke. Have longer stroke for greater volume.

Low maintenance: Ruggedly built to stand up under hard, continuous operation. Dust and dirt can't enter the new Auto-Cycle air valve. Fluids cannot work up into the motor. No lubrication required.

Uses less air: Large ports minimize back pressure. Precision manufacture reduces friction.

Send today for your copy of Binks Bulletin 701 which describes the many advantages and economies of a paint circulating system using Binks Material Handling Pumps. Binks engineers will be glad to help you select and install the right equipment. Write to the address below:

Binks air-operated pump elevator speeds up drum changing

This new Model 41-9000 air-operated pump elevator pays for itself many times over in the time and labor it saves. It quickly lifts the entire pump assembly clear of a 55-gallon drum and holds it there while drums are changed.

GUNS

COMPRESSORS

FREE INSTRUCTION

Binks
EVERYTHING FOR SPRAY PAINTING

150-55

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Save time, work, and money in plant engineering operations

Use these engineering methods and practices developed by top men in the field!

Here's a library that will help you *quickly and efficiently* handle the basic operations that the man concerned with plant engineering must perform in his daily work. What's more, these books give you the kind of all-around engineering knowledge that will help you solve the more difficult and specialized problems every plant engineering man faces from time to time.

This Library shows you how to select, install, operate, and repair electronic control equipment, pumps, the basic types of industrial piping, and many varieties of control instruments and control systems. In addition, there is help on industrial waste treatment and modern methods of materials handling.

PLANT ENGINEERS' LIBRARY

6 vol., 2479 pages, 1825 illustrations

Gives you help like this—

- **how to make materials handling operations more efficient**
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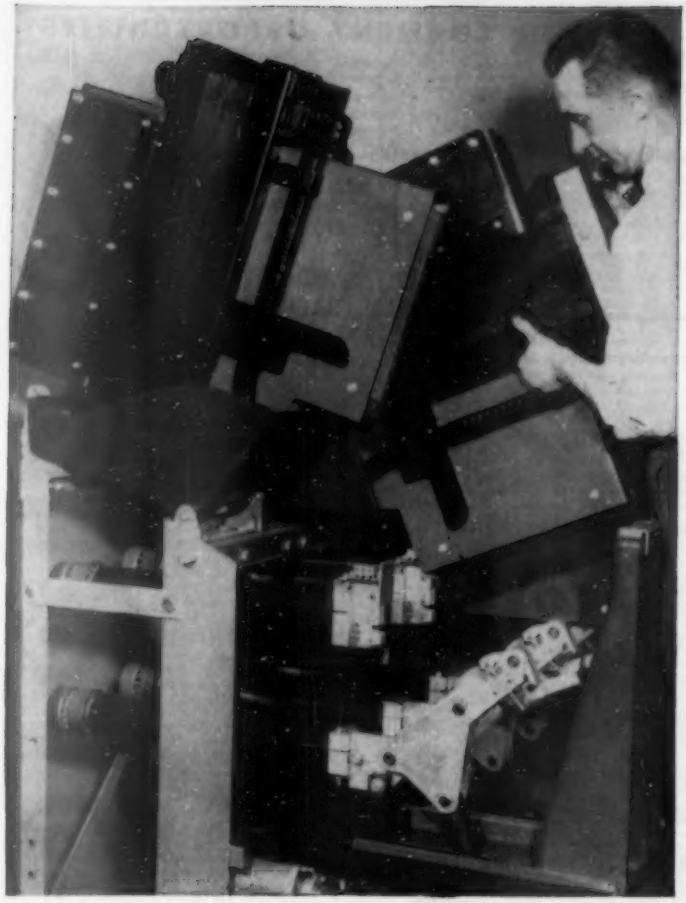

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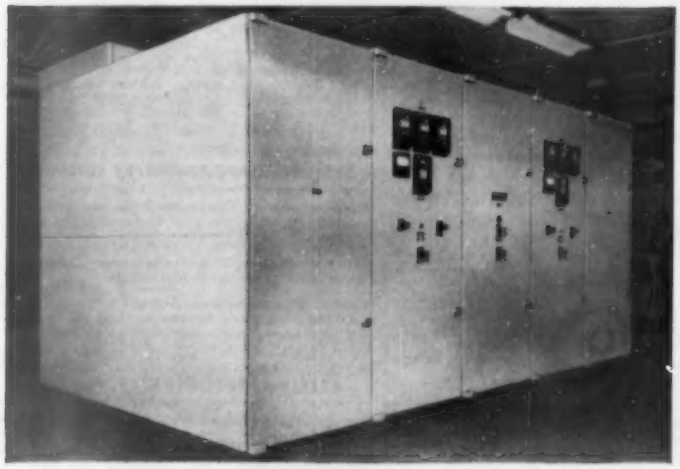

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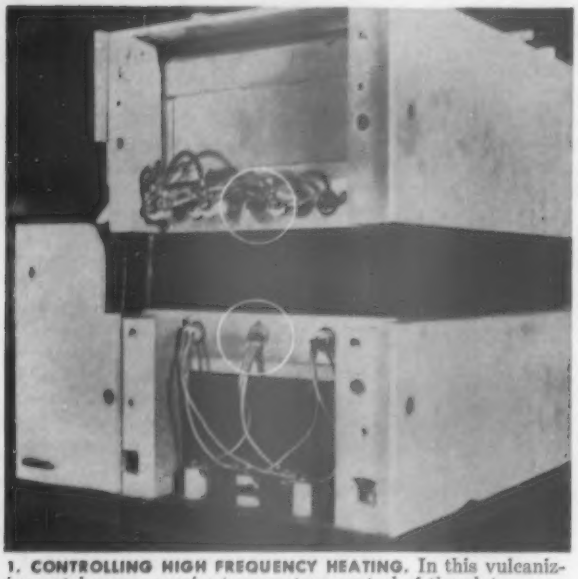
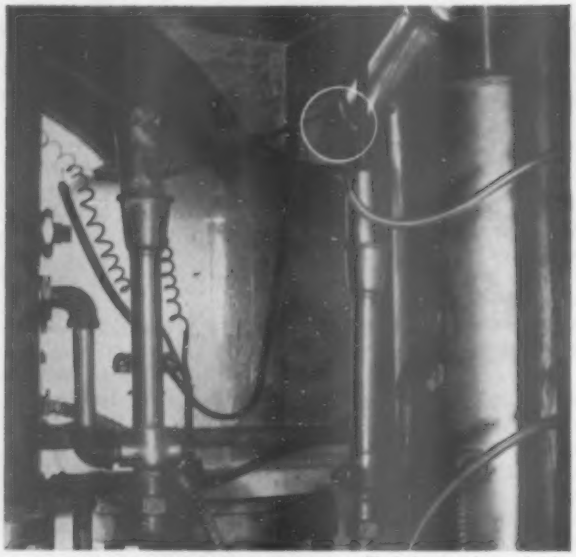
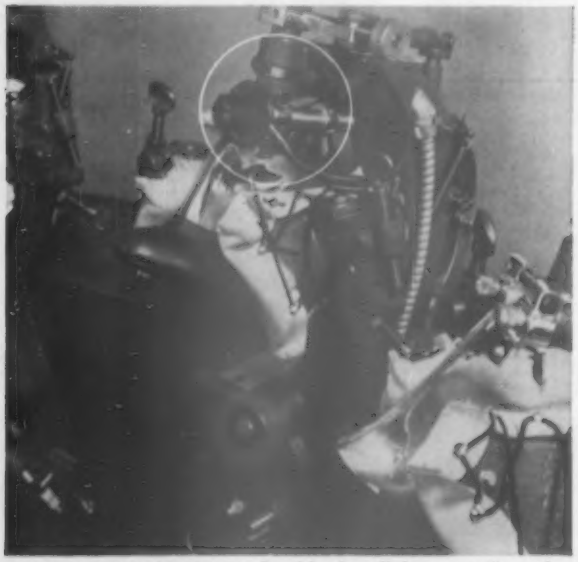


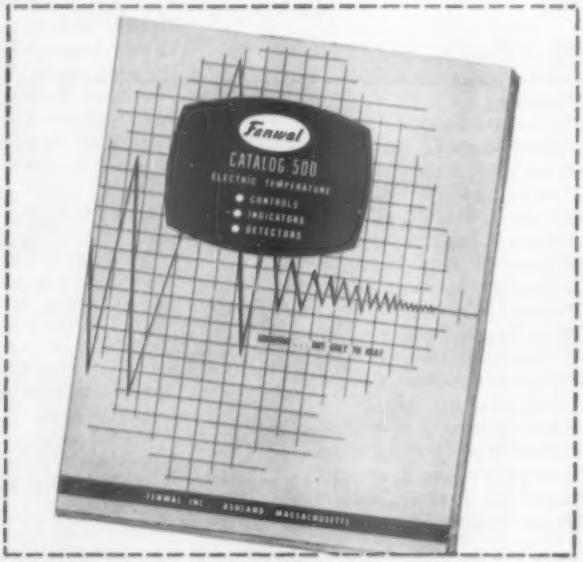
1. CONTROLLING HIGH FREQUENCY HEATING. In this vulcanizing patch press, precise temperature control of the platens was required to prevent loss of electronic heat generated within the processed material. Fenwal's solution was two THERMOSWITCH® units, set at 400F, mounted on the platens. Result: a production rate of 3,000 patches per hour, compared to ordinary hot press methods of 30 per hour.



2. SAFETY IN A DISTILLING PROCESS called for a dependable failure alarm. A Fenwal THERMOSWITCH unit in the condenser's safety vent solved the problem. Now, should the cold water supply fail, steam blowing through the condenser tubes will hit the THERMOSWITCH unit. This control, set at 120F, will then open, shutting off the electric heaters and sounding a continuous alarm.



3. PROTECTING PRODUCTS. In this shoe lining smoother, the problem was twofold: to use the fewest possible thermostats; provide close temperature control in order to prevent burning of shoe leather. Fenwal's solution: a single adjustable THERMOSWITCH unit, mounted on one ironer and controlling two ironers. This halved the number of thermostats indicated, while providing precision temperature control.



4. SEND FOR NEW CATALOG, just off the press. It describes Fenwal's complete line of THERMOSWITCH units and new indicating controllers for industrial applications. Fenwal engineers are always glad to help on any of your temperature control problems. Write **Fenwal Incorporated, 610 Pleasant St., Ashland, Massachusetts.**

Fenwal **THERMOSWITCH®**

Controls Temperature — Precisely

HERE'S A HANDY POSTCARD THAT WILL HELP YOU–

GET MORE INFORMATION

How to use this Reader Service Card . . .

The bottom of this page is a postcard—you'll note that the page has been perforated so you can tear it out easily. This postcard makes it easy for you to get more information on anything that's advertised in FACTORY, or listed in FACTORY's *Catalog News, Equipment News,* and *Materials News Sections.*

Catalog News Section: Starts on page 156. FACTORY's Editors look at scores of catalogs each month, and select those that will be most helpful to you. In the Catalog News Section of the postcard, circle the numbers corresponding to the numbers of the catalogs you want. You'll get them—without obligation—direct from the manufacturer.

Equipment News Section: Starts on page 158. Here FACTORY's Editors describe various kinds of new equipment that will help you solve plant problems. In the Equipment News Section of the postcard, circle the numbers of the items you'd like to know more about. You'll get information direct from the manufacturer—without obligation.

Materials News Section: Starts on page 286. Out of the many new materials announced each month, FACTORY's Editors pick out those most useful to you. In the Materials News Section, circle the items you want to know more about. You'll hear direct from the manufacturer—no obligation.

Advertising Section: The postcard has numbers corresponding to the page numbers of the advertisements. Circle the page numbers of those you're interested in. Where more than one advertisement is on a page, the letters L, R, T, B indicate location: left, right, top, bottom.

Then be sure: Fill out your name, address, and other information in the space provided, tear out the card, drop it in the mail. The data requested will be forwarded to you shortly.

FACTORY: Send me more information about . . . **OCTOBER 1955**

(Good until December 31, 1955)

. . . items in the CATALOG NEWS SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78										

. . . items in the EQUIPMENT NEWS SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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. . . items in the MATERIALS NEWS SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

. . . items ADVERTISED on the pages circled below:

1	4	5	6	7	8	9	10	11	12	13	14	15	16	16a	16b	17	19	21	23	25	2
32	32a	33	35	37	39	41	43	45	47	48	48a	49	51	53	55	57	61	62	63	64	64a
64b	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	151	153	155
157	159	161	162	163	164	165	166	167	168	170	171	172	173	175	176	176a	176b	177	178	179	180
181	182	183R	184	185	186	187	188	189	190	191	192	192a	193	194	195	196	197	198	199	200	201
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346B	347	348T	348B	348R	349	350L	350T	350B	351	352T	352B	352R	353	354L	354T	355	356L	356R	357	358T	358B
358R	359	360L	361	362L	363	368	Second Cover		Third Cover		Fourth Cover										

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...at the advertising in this FACTORY issue

...at FACTORY's Catalog News Section

...at FACTORY's Equipment News Section

...at FACTORY's Materials News Section

...and then circle on this handy postcard the items you want to know more about.

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Every month in FACTORY you can use this free service to get useful literature. And every month in FACTORY's advertising pages, leading manufacturers show you new ways, better ways to cut costs, boost production.

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PERMIT No. 64
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FACTORY Management & Maintenance

330 WEST 42nd STREET

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EASIER TO INSTALL AND MAINTAIN!

mount 1 device instead of 2

extra-wide gutters

all components accessible from front

plenty of knockouts

SQUARE D COMBINATION STARTERS

(Switch or Circuit Breaker Types)

Save space and time. Mount and wire one device instead of two . . . neater, more attractive installations.

Write **for Bulletins 8538 and 8539**
Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Squirrel cage motors, slip ring motors, synchronous motors, repulsion induction motors, capacitor motors, direct current motors . . . open, enclosed, splash-proof, fan-cooled, explosion-proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical and electronically-controlled variable speed units . . . with fluid drives . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU.

And all of these, the electric motors . . . the electric brakes . . . the fluid drives . . . the gear reduction units . . . the variable speed drives . . . all are designed so they can be easily combined together to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT mounting features in one compact power drive.

That's the horsesense way to use horsepower whether you want ⅛ horsepower or 400 horsepower.

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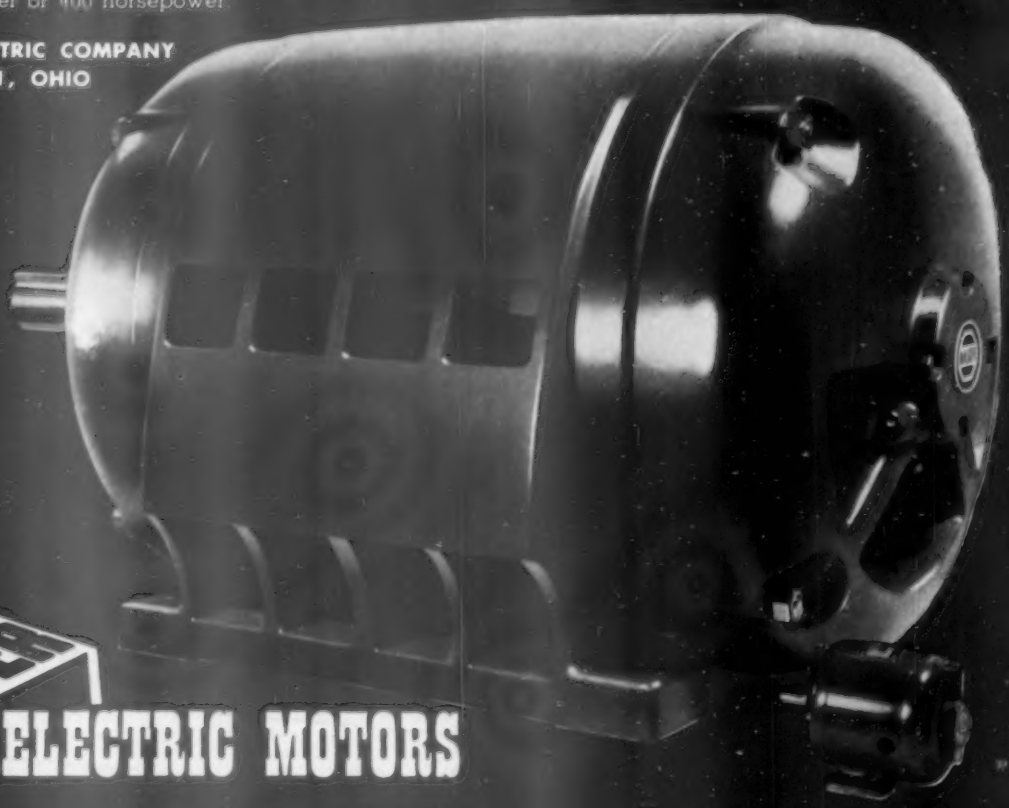
1/8 TO 400 HORSEPOWER



MASTER ELECTRIC MOTORS